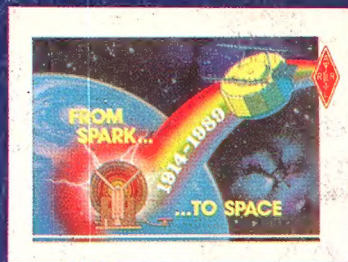
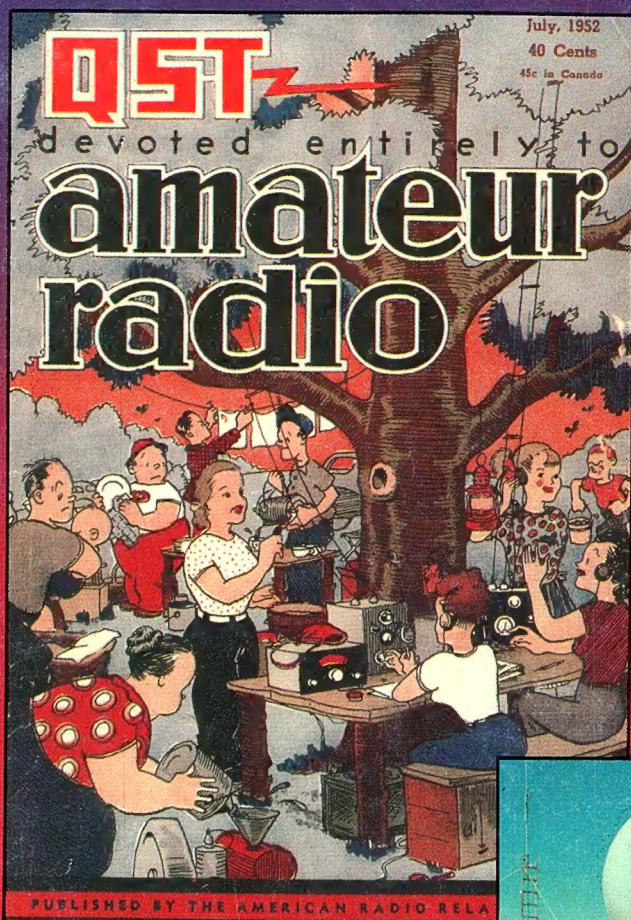


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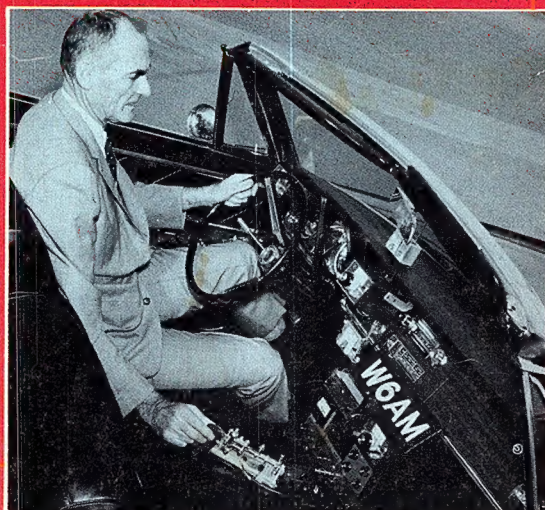
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devoted entirely to Amateur Radio



FIELD DAY THROUGH THE YEARS



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Henry Radio offers the widest choice of amplifiers in the world. We design and produce amplifiers to fit different needs and different budgets. We feel we offer the best equipment and there are a lot of amateurs who obviously agree. That's why we've sold over 40,000 amplifiers during the last 25 years. If you plan to buy an amplifier, do yourself a big favor. . .call, write, FAX, or come in. But make sure you have our new information packet in your hands before you make a decision. You owe it to yourself. Read it through, compare the specs, compare prices, compare **VALUE**.

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TM-231A/431A/531A

FM Mobile Transceiver

Looking for a compact transceiver for your mobile VHF and UHF operations? KENWOOD has a compact rig for each of the most popular VHF/UHF bands.

- **20 multi-function memory channels.**

20 memory channels allow storage of frequency, repeater offset, CTCSS frequency, frequency step, Tone On/Off status, CTCSS and REV.

- **High performance—high power!** 50W (TM-231A), 35W (TM-431A) with a 3 position power switch (high, medium, low).

- **Optional full-function remote controller (RC-20).**

A full-function remote controller using the Kenwood bus line, model RC-20, may be easily connected to the TM-231A/431A/531A and can be mounted in any convenient location. Using the IF-20 interface the RC-20 may be connected to four mobile transceivers.

(TM-231A/431A/531A or the TM-701A)

- **Multi-function DTMF mic. supplied.**

Controls are provided on the microphone for CALL (Call Channel), VFO, MR (Memory Call) or to change the memory channel) and a programmable function key. The programmable key can be used to control one of the following on the radio: MHz, T. ALT. TONE, REV, DRS, LOW or MONITOR.

- **Easy-to-operate illuminated keys.**

A functionally designed control panel with backlit keys increases the convenience and ease of operation during night-time use.

- **Auto repeater offset on 144 and 220 MHz.**

- **Built-in digital VFO.**

a) **Selection of the frequency step (5, 10, 15, 20, 12.5, 25kHz)**

*TM-531A: 10, 20, 12.5 25kHz

b) **Programmable VFO**

The user friendly programmable VFO allows the operator to select and program variable tuning ranges in 1 MHz band increments.

- **Programmable call channel function.**

The call channel key allows instant recall of your most commonly used frequency data.

- **Selectable CTCSS tone built-in.**

- **Tone alert system—for true "quiet monitoring"!**

When activated this function will cause a distinct beeper tone to be emitted from the transceiver for approximately 10 seconds to signal the presence of an incoming signal.

- **Easy-to-operate multi-mode scanning.**

Band scan, Program band scan, Memory scan plus programmable memory channel lock-out, with time operated or carrier operated stop.

- **Priority alert.**

- **DRS (Digital recording system).**

The optional DRU-1 can store received and transmitted messages for up to 32 seconds, allowing the operator to quickly check or return any call using the tone alert system.

- **Automatic lock tuning function (TM-531A).**

- **Repeater reverse switch.**



Optional Accessories

- **RC-20** Full-function remote controller
- **RC-10** Multi-function remote controller
- **IF-20** Interface unit handset
- **DRU-1** Digital recording unit
- **MC-44** Multi-function hand mic.
- **MC-44DM** Multi-function hand mic. with auto-patch
- **MC-48B** 16-key DTMF hand mic.
- **MC-55** 8-pin mobile mic.
- **MC-60A/80/85** Desk-top mics.
- **MA-700**

- Dual band (2m/70cm) mobile antenna (mount not supplied)
- **SP-41** Compact mobile speaker
- **SP-50B** Mobile speaker
- **PS-430** Power supply
- **PS-50** Heavy-duty power supply
- **MB-201** Mobile mount
- **PG-2N** Power cable
- **PG-3B** DC line noise filter
- **PG-4H** Interface connecting cable
- **PG-4J** Extension cable kit
- **TSU-6** CTCSS unit

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Long Beach, CA 90801-5745
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Mississauga, Ontario, Canada L4T 4C2

Specifications and prices subject to change without notice or obligation.
Complete service manuals are available for all Kenwood transceivers and most accessories.

ICOM

IC-2400 UHF/VHF Mobile
IC-2500 UHF/1.2GHz Mobile



NOW YOU DON'T HAVE TO DOUBLE UP!

10 watts on 1.2GHz. Both units include selectable low power for working local stations.

Stack today's rapidly expanding VHF/UHF action in your favor with the most advanced design yet easy-to-operate FM dual banders on the road: ICOM's IC-2400 2-meter/440MHz or IC-2500 440MHz/1.2 GHz.

Their overlapping band ranges are great for present use and future expansions, and their wide array of impressive features make your auto a double-mobile winner!

WIDEBAND COVERAGE.

The IC-2400's range of 138-174MHz RX/140-150MHz TX and 440-450MHz RX/TX includes NOAA weather reception plus liberal overlap for MARS/CAP operation. The innovative IC-2500 receives and transmits 440-450MHz and 1240-1300MHz.

HIGH POWER RADIOS!

The IC-2400 delivers 45 watts output on two-meters, 35 watts on 440MHz. The IC-2500 features 35 watts on 440MHz

FULL DUPLEX OPERATION.

Both transceivers transmit on one band while simultaneously receiving on another. Both radios feature independent offsets for each band. It's like having two separate radios in one! Perfect for true telephone-style auto-patching with a modern crossband repeater!

SIMULTANEOUS DUAL BAND RECEPTION.

Monitor both bands on the internal speaker, or add external speakers. Each band features separate volume and squelch controls.

40 MEMORIES.

Twenty per band. Store frequencies, PL tones and TX offsets for super-convenient mobiling!

PROGRAMMABLE BAND AND MEMORY SCANNING.

You set the limits and select/lockout preferred memories. ICOM's IC-2400 and

IC-2500 monitor the action. A sheer VHF/UHF delight!

Additional features include: **Priority Watch.** Monitor one channel's activity while operating on another frequency. **Two Call Channels.** One on each band for quick, single access to your favorite repeater. **A Repeater Input Monitor Switch** for rapid checks of TX offset and evaluation of direct range. Plus, an **Optional Beeper** silently monitors any selected frequency or repeater for calls with your preselected CTCSS subaudible tone.

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All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 2400/2500789

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OUR COVER

To many, Field Day is ham radio. This month's cover shows: QST's July 1952 FD cover cartoon; Steve Mesko, WB7Y, preparing a tower for FD '89; Byron Goodman, W1JPE, now W1DX, operating FD in '37; Don Wallace, W6AM/6 (SK), operating CW mobile during FD '67; the W6YL team preparing a balloon-supported skywire for FD '88; and the W6DIS/6 18-watt, 3690-kc rig that won FD in '34 with 58 QSOs. Field Day results begin on page 72.

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AEA's NEW PK-232MBX With PakMail™



```

PACKET  CONVERSE  CONNECTED TO N7HJD  81-May-88  TX  918
CHANNEL 0  SBS      (88 88)  L2  1  1  15:53  QRT  62223
          DISPLAYING ALL  HIT F1 FOR HELP

5531 B$ 4287 ALL QWAGB N7BFC 24-Jan pk-fax...new!
5458 B$ 2956 ALL QWAGB K17H 28-Jan Hans & Leukenia
5457 B$ 4637 ALL QWAGB K17H 28-Jan KD7IK

Enter connect path, hit CR to terminate:

N7HJD

5112 B$ 1612 ALL QWAGB VE7DFM 04-Jan Packet in South Africa.
5111 B$ 1370 TCP/IP QWAGB VE7DFM 04-Jan International TCP/IP news.
5866 B$ 439 ALL QWAGB VE7DQC 03-Jan TANDON DRIVE PARTS
2849 B$ 537 ALL WA7NTF 12-Sep PK232 Settings For KISS Mode
N7EOM Mbx>

Signal here is good, I am using an ICOM 2BA, PK-232, IBM Turbo XT Clone, all
going into an Isopole, 50 feet up...
    
```

Now AEA's popular PK-232MBX multi-mode data controller has all of the features you've been asking for...PakMail™ mailbox with third-party traffic, seven-character AMTOR sel-call, TDM (Time Division Multiplexing) Rx for SWL and priority acknowledgment features. Compatible with almost every computer or data terminal, you can enjoy the full spectrum of digital communications with the PK-232MBX.

All Operational Modes. The PK-232MBX includes all of the **recognized** data modes available today... AMTOR, ASCII, Baudot, CW, FAX Tx and Rx, NAVTEX marine and packet.

Modem Superiority. An eight-pole chebyshev bandpass filter limiter-discriminator modem enhances the signal-to-noise ratio at the detector and virtually eliminates interference from adjacent signals. This system is superior to PLL modem technology which was designed for minimal noise interference.

PakMail.™ PakMail™ mailbox with third-party traffic is now a standard feature. Leave and retrieve packet messages around the clock. The PakMail™ plug-in board/update is compatible with all PK-232's. Contact factory for details. The upgrade also includes TDM (Time Division Multiplexing) decoding and seven-character AMTOR sel-call. Priority acknowledgment is also included to reduce packet collisions.

FAX Transmission. The **first** multi-mode TNC to transmit FAX, the PK-232/MBX supports the widest range of printers using the optional RS-232/printer cable.

Host Mode. Only AEA provides a fully functional Host Mode which enables programs to control the TNC more efficiently. Programs include PC-Pakratt with FAX for IBM PC and compatible computers, COM-Pakratt with FAX for the Commodore 64 and 128, and now MacRATT with FAX for the Macintosh.

Two Radio Ports. Independent radio connection ports allow interchangeable HF or VHF operation, selectable from the front panel for convenience.

Signal Analysis. The PK-232MBX internal software has the exclusive SIAM™ (Signal Identification and Acquisition Mode) feature, which lets you tune an unidentified signal. The PK-232MBX can automatically determine the signal's mode, baud rate or speed and configuration.

You Deserve the Original. AEA was the first to produce a multi-mode TNC, and it still remains the standard by which all other TNC's are compared. Don't settle for less.

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R5

10, 12, 15, 17, 20 METERS

Communicate From the Tight Spots



R5 is the antenna designed for space age living, on small city lots, apartments, condominiums or for travel in motor homes. If you have limited space, or galaxies of space, R5 will give the most performance from your transceiver.

R5 electrical halfwave, only 16' 4" tall design allows the antenna to be mounted virtually

anywhere, without compromising performance. It easily handles 1800 watts of power with a solid state matching network giving full band coverage of 10-12-15-17-20 meters.

Easy set-up makes this antenna ideal for portable or fixed installations. It performs without a rotator, or tower. A simple sup-

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"DX-citing!"

TS-440S Compact high performance HF transceiver with general coverage receiver

Kenwood's advanced digital know-how brings Amateurs world-wide "big-rig" performance in a compact package. We call it "Digital DX-citement"—that special feeling you get every time you turn the power on!

• Covers All Amateur bands

General coverage receiver tunes from 100 kHz—30 MHz. Easily modified for HF MARS operation.

• Direct keyboard entry of frequency

• All modes built-in

USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.

• VS-1 voice synthesizer (optional)

• Superior receiver dynamic range

Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m)

• 100% duty cycle transmitter

Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)

• Built-in automatic antenna tuner (optional). Covers 80–10 meters.

• 5 IF filter functions

• VOX, full or semi break-in CW

• Dual SSB IF filtering

A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, dual filtering is provided.

• AMTOR compatible

• Adjustable dial torque

• 100 memory channels

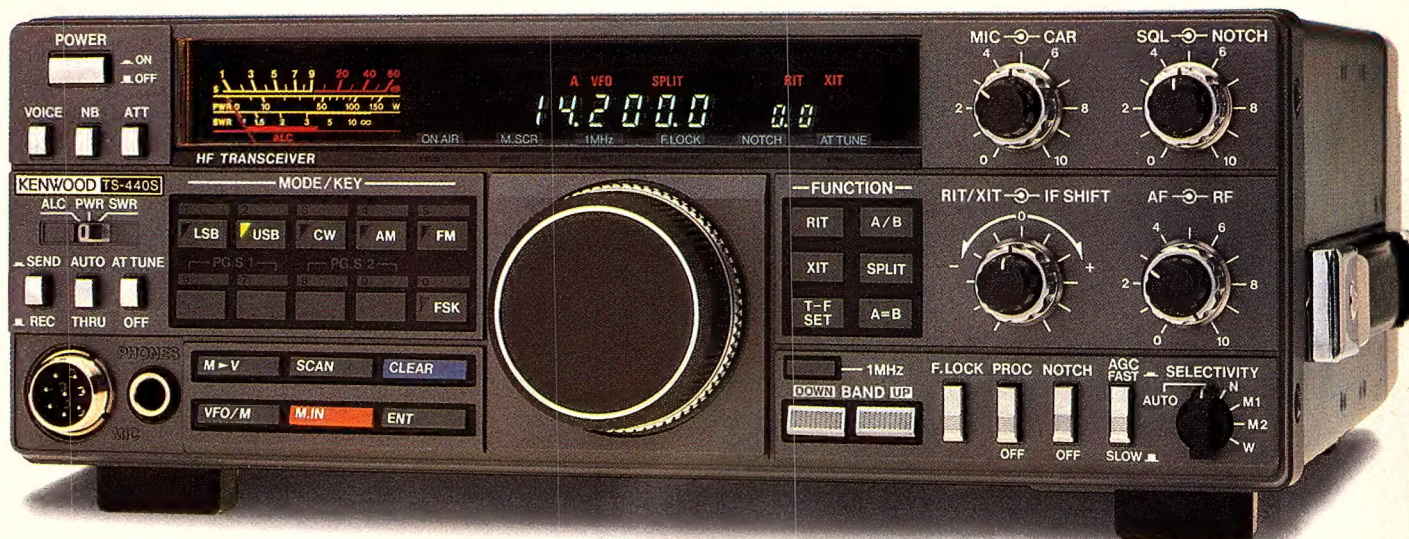
Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.

• TU-8 CTCSS unit (optional)

IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM.

• MC-43S UP/DOWN mic. included

• Computer Interface port



Optional accessories:

- AT-440 internal auto. antenna tuner (80 m – 10 m)
- AT-250 external auto. tuner (160 – 10 m)
- AT-130 compact mobile antenna tuner (160 m –

- 88SN 2.4 kHz/1.8 kHz SSB filters • MC-60A/80/85 desk microphones • MC-55 (8P) mobile microphone • HS-4/5/6/7 headphones • SP-41/50/50

Kenwood takes you from HF to OSCAR!



- 10 m) • IF-232C/IC-10 level translator and modem IC kit • PS-50 heavy duty power supply • PS-430/PS-3D DC power supply • SP-430 external speaker • MB-430 mobile mounting bracket • YK-88C/88CN 500 Hz/270 Hz CW filters • YK-88S-

- mobile speakers • MA-5/VP-1 HF 5 band mobile helical antenna and bumper mount • TL-922A 2 kw PEP linear amplifier • SM-220 station monitor (no pan display) • VS-1 voice synthesizer • TU-8 CTCSS tone unit • PG-2C extra DC cable.

Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.

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#1 Rated HF!



TS-940S Competition class HF transceiver

TS-940S—the standard of performance by which all other transceivers are judged. Pushing the state-of-the-art in HF transceiver design and construction, no one has been able to match the TS-940S in performance, value and reliability. The product reviews glow with superlatives, and the field-proven performance shows that the TS-940S is "The Number One Rated HF Transceiver!"

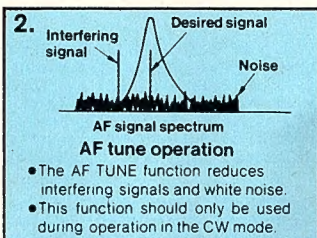
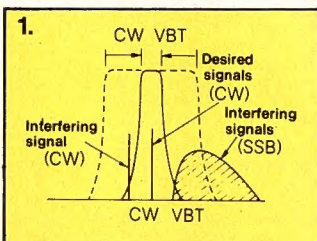
- **100% duty cycle transmitter.** Kenwood specifies transmit duty cycle **time**. The TS-940S is guaranteed to operate at full power output for periods **exceeding one hour**. (14.250 MHz, CW, 110 watts.) Perfect for RTTY, SSTV, and other long-duration modes.
- **First with a full one-year limited warranty.**
- **Extremely stable phase locked loop (PLL) VFO.** Reference frequency accuracy is measured in **parts per million!**

Optional accessories:

- AT-940 full range (160-10m) automatic antenna tuner
- SP-940 external speaker with audio filtering
- YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters
- YK-88A-1 (6 kHz) AM filter
- VS-1 voice synthesizer
- SO-1 temperature compensated

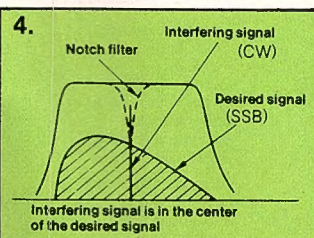
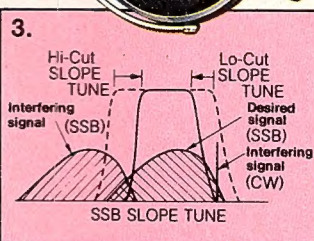
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- crystal oscillator
- MC-43S UP/DOWN hand mic.
- MC-60A, MC-80, MC-85 deluxe base station mics.
- PC-1A phone patch
- TL-922A linear amplifier
- SM-220 station monitor
- BS-8 pan display
- IF-232C/IF-10B computer interface.



1) CW Variable Bandwidth Tuning. Vary the passband width continuously in the CW, FSK, and AM modes, without affecting the center frequency. This effectively minimizes QRM from nearby SSB and CW signals.

2) AF Tune. Enabled with the push of a button, this CW interference fighter inserts a tunable, three pole active filter between the SSB/CW demodulator and the audio amplifier. During CW QSOs, this control can be used to reduce interfering signals and noise, and peaks audio frequency response for optimum CW performance.



3) SSB Slope Tuning. Operating in the LSB and USB modes, this front panel control allows independent, continuously variable adjustment of the high or low frequency slopes of the IF passband. The LCD sub display illustrates the filtering position.

4) IF Notch Filter. The tunable notch filter sharply attenuates interfering signals by as much as 40 dB. As shown here, the interfering signal is reduced, while the desired signal remains unaffected. The notch filter works in all modes except FM.

- **Complete all band, all mode transceiver with general coverage receiver.** Receiver covers 150 kHz-30 MHz. All modes built-in: AM, FM, CW, FSK, LSB, USB.
- **Superb, human engineered front panel layout for the DX-minded or contesting ham.** Large fluorescent tube main display with dimmer; direct keyboard input of frequency; flywheel type main tuning knob with optical encoder mechanism all combine to make the TS-940S a joy to operate.
- **One-touch frequency check (T-F SET) during split operations.**
- **Unique LCD sub display indicates VFO, graphic indication of VBT and SSB Slope tuning, and time.**
- **Simple one step mode changing with CW announcement.**
- **Other vital operating functions.** Selectable semi or full break-in CW (QSK), RIT/XIT, all mode squelch, RF attenuator, filter select switch, selectable AGC, CW variable pitch control, speech processor, and RF power output control, programmable band scan or 40 channel memory scan.

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THE AMERICAN RADIO RELAY LEAGUE, INC



The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1986. Its affairs are governed by a Board of Directors, whose voting members are elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

"Of, by, and for the radio amateur," ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

A bona fide interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although, full voting membership is granted only to licensed amateurs in the US.

Membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA.

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"It Seems to Us ..."

License Fees

Not for the first time, radio amateurs in the United States face the possibility of having to pay a fee when applying to the FCC for a new license, or for any change in their existing license.

Most members we've talked to since the issue resurfaced are not flatly opposed to a license fee. They simply want a fee system that doesn't discourage people from entering Amateur Radio or from upgrading, and that doesn't exceed the actual cost of administration. They also want the government to provide needed services in return; they're tired of listening to the broken record that goes, "We know that's what the rules say, but we don't have the wherewithal to enforce the rules."

Unfortunately, the measures being discussed in Congress have some very undesirable features, and none of the desirable ones. On Capitol Hill, a fee schedule for amateur licenses is not seen as a way of funding increased services to licensees. It is simply viewed as one of the many tiny thimbles with which the ocean of red ink in the federal budget is to be bailed out. Amateur license fees are simply a way to raise an estimated \$3 million to help offset the couple of hundred billion dollars of annual deficit.

At this writing, the House has under consideration H.R. 3299, the Omnibus Budget Reconciliation Act of 1989. Under Section 4701(a) of H.R. 3299, any time a Form 610, 610-A, or 610-B was submitted to the FCC it would cost \$30.00. Special Temporary Authority requests, modifications, and extensions would cost \$30.00. Waiver requests would cost \$105.00. The Senate Budget Committee has a similar measure under consideration, but the Senate price tag is \$35.00.

With license terms of ten years, either the House or the Senate version would come to less than a penny a day. It's difficult for a longtime, dedicated radio amateur to argue that a ham ticket isn't worth at least that much to him. But the proposed fee schedule is much more insidious than that. To begin with, \$30.00 or \$35.00 is a lot of money for someone to fork over at the point of entry. Last month, *QST* carried a story about 65 new hams in a Bardstown, Kentucky, middle school where the total investment in the school radio station came to less than \$1,500. Would the parents and the school system be as enthusiastic about the program if another \$2,000 in license fees was added to the up-front cost? Now, let's say that each student wants to upgrade the following year; that's another \$2,000. And that's just one upgrading step; progressing all the way to Extra could cost each and every licensee \$150.00—and that doesn't even include the reimbursement for the Volunteer Examiner program, which operates at no cost to the government. Taking

several people in the same family and turning them into enthusiastic radio amateurs could drain hundreds of dollars out of their family treasury before they even got on the air.

License modifications include changes of station location. It doesn't take a rocket scientist to figure out what will happen if the government charges people for the privilege of updating the government's records of where they live: the records will quickly become as useless as an old telephone directory.

A reciprocal permit is only valid for one year at most, and many applicants come from countries with foreign-exchange restrictions. Instead of being vehicles for international good will, a \$30.00 or \$35.00 fee will turn reciprocal permits into something only well-heeled visitors can afford.

On the Hill, we've pointed out that \$3 million is a phony figure. It assumes that there will be just as many applications, at \$30.00 or \$35.00 each, as there are when the applications are free. It assumes that processing the fees will not increase the cost of processing applications. Even if it weren't a phony figure, what is the cost to the country when we discourage young people and retirees from entering a corps of technically qualified, service-oriented volunteers, and from upgrading their skills once they enter? How can the government that uses Amateur Radio communications in emergencies such as Hurricane Hugo justify imposing a fee on the very people who provide that service—and who are barred from accepting remuneration? Doesn't this really amount to a new tax, imposed on volunteers?

These are questions that deserve to be answered before Congress instructs the FCC to charge fees of its amateur licensees. Unfortunately, as we went to press it seemed unlikely that this would occur on the House side. Our best hope was that Senator Carl Levin of Michigan was working on an amendment to reduce or eliminate amateur license fees, and that such an amendment would be adopted by the Senate and would prevail when the Senate and House versions of the bill went to a joint Conference Committee for reconciliation. The time frame for all this to happen probably will have passed by the time you read these lines, but if you've been copying W1AW bulletins you'll know how it turned out.

Of course, there's always a possibility that Congress will have moved more slowly than predicted. There may still be time to write your Senators and ask that they support the Levin Amateur Radio Amendment to the Budget Reconciliation Bill, and to write your Congressman urging support for the amendment in the Conference Committee. Warm up your receiver!—David Sumner, K1ZZ.

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UP FRONT in QST

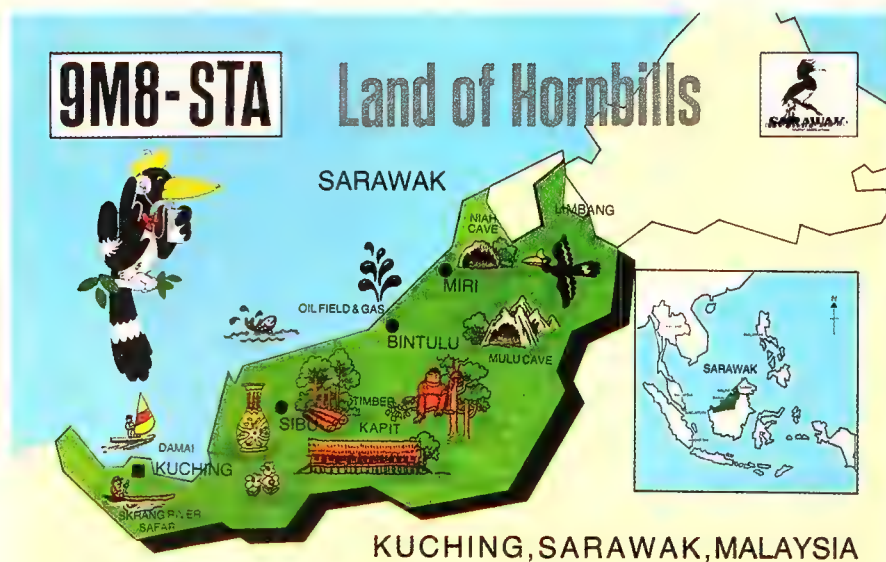


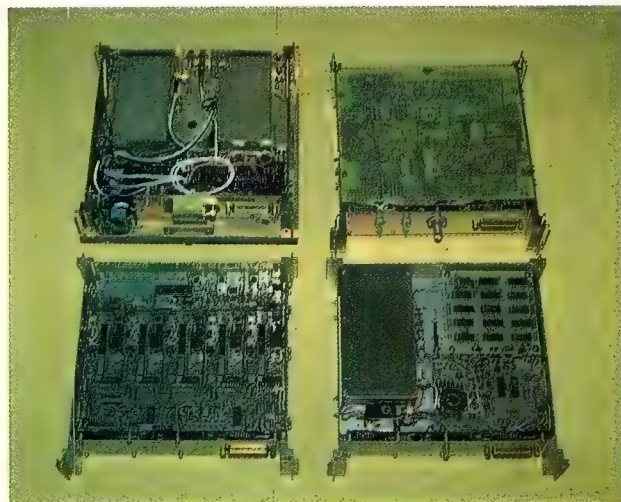
Hoist away! Jeff Bauer, WA1MBK (on the tower), and Mark Wilson, AA2Z, install the first of many new antennas on the 120-foot tower at W1AW. Plans call for fixed 3-element Yagis on 10, 12, 15, 17 and 20 meters, 2-element Yagis on 30 and 40 meters for bulletin and code-practice transmissions, as well as rotatable antennas for two-way contacts. Bill Myers, K1GQ, custom designed the 3-element Yagis especially for W1AW use. They have a wide impedance bandwidth to be able to cover W1AW's widely spaced CW and phone bulletin frequencies. Cushcraft manufactured the custom antennas and donated them to the League. We'll show you more of W1AW's new skyhooks in upcoming issues of QST. Be sure to give W1AW a listen, as the transmissions will be emanating from the improved facilities by the time you're reading this.

Worked 'em all: George De Grenier's face shows determination—the kind of determination it takes to confirm more countries on the *DXCC Countries List* than anyone else. W1GKK hasn't missed a country in 43 years! The skill and Yankee perseverance required for this feat is described by Rick Booth, KM1G, in this month's QST Profile. (KM1G photo)



Land of Hornbills: Here's the QSL from the August operation of 9M8STA, the first special-event station from Kuching, Sarawak, Malaysia. A group of 13 amateurs made 3039 contacts in 48 hours, with 600 of those being on 6 meters. Read more about the operation in the article by IARU Region III Director D. D. Devan, 9M2DD, in this month's IARU News.





Stacking up nicely: AMSAT volunteer Jeff Zerr assembles the Weber State College Microsat. The design of the Microsats allows each subsystem to be built in its own modular box. In the photograph at right, the individual modules are (clockwise from upper left) the transmitter module, battery/power module, AMSAT Argentina (LUSAT) module, and LUSAT receive module. (The CPU module isn't shown.) Read more about the impending launch and these new OSCARs' packet-radio capabilities in this month's Amateur Satellite Communication column. (*N4HY photos*)

Want a Place in Up Front?

Have a news item of an interesting twist concerning Amateur Radio, with a good color photograph? It just may be the ticket for a future edition of Up Front. Here are some hints to improve your chances of getting that item in print.

- 1) Be sure the item is of interest to most hams.
- 2) Amateur-Radio-in-action shots are preferred over staged stand-up awards presentations; ie, we'd prefer to have a photograph of a ham doing what he got the award for, rather than a shot of the ham receiving the award.
- 3) Photographs must be in color. Transparencies reproduce best, and print enlargements should be at least 4 × 6 inches. No Polaroids®, please.
- 4) Include all pertinent information and identify everyone in the photograph. Don't forget to include a photo credit.
- 5) Send all material to ARRL, Up Front Editor, 225 Main St, Newington, CT 06111.



Simplex to duplex: The "arch of sabers" is performed with hand-helds as Dave Rhodes, N1EYO, weds Kimberly Wood, KA1TYI. The best man was KA1OXO, and the mother and father of the bride, K1TFW and K1TFX. Forming the arch are WS5V, KA1ROE and XYLs of KA1KAO and KA1ROE—with even more hams in attendance at the ceremony! All the amateurs are members of the Aroostook (ME) Amateur Radio Association. (*KA1KAO photo*)

Field Day 1989



The crew at KH6JIX picked a great spot for Field Day—Sand Island State Park, Oahu, Hawaii.



Jeff Damm, WA7MLH, ran solar-powered 2-meter FM and 40-meter CW on Mt Tumalo in central Oregon.



Boy Scout Troop 298 operated CW at the Texins Amateur Radio Club station, K5OJI, at Erwin Park in McKinney, Texas. (N3BAO photo)



George Hart, W1NJM, pecks away to generate CW at the Newington Amateur Radio League, W1OKY, setup. (AA2Z photo)



The gang at NW6A, the Los Angeles County Disaster Communications Service, used the Sheriff's Mobile Radio Station for housing their HF CW and 2-meter multimode stations at the Circle X Ranch in the Santa Monica Mountains National Recreation area.



The KK7A site was atop 7650-foot House Mountain about 30 miles east of Boise, Idaho. (KK7A photo)

League Lines

It's Official: The ARRL has gone to court to challenge the FCC's 220 MHz reallocation decision. A petition was filed September 28 requesting that the US Court of Appeals for the DC District review the decision which the ARRL believes to be arbitrary, capricious, an abuse of discretion and not in accordance with the law. More information will appear in next month's Happenings column.

Effective immediately, ***the League will now accept 10-MHz contacts for the following awards:*** WAS (basic, CW, RTTY, packet and QRP; but no single-band or 5-Band WAS); DXCC (CW and digital QSOs for mixed, CW and RTTY awards, but no 5-Band DXCC). IARU officials at the Region 2 Conference in Orlando adopted the change, which now allows awards credits on 10 MHz. The policy now conforms with 10-MHz award credit rules in Regions 1 and 3.

10-MHz users are reminded to avoid causing interference to stations operating in the Fixed Service. The conference attendees noted the special need to maintain the highest operating standards in the period prior to the 1992 World Administrative Radio Conference.

Many of the first reports from the affected areas by ***Hurricane Hugo*** were from Amateur Radio stations. At press time, the story of the hurricane disaster was still unfolding, and *QST* will have more information on amateur activities as it becomes available.

The Field Services Department is most interested in gathering the stories of groups and individuals who participated in Hurricane Hugo Communications effort for compilation in a future *QST* article. Please send your articles and photos to Rick Palm, K1CE, at HQ.

Attention repeater owners/trustees: It's now time to submit your repeater changes and updates to your frequency coordinator for inclusion in the 1990-91 issue of *The ARRL Repeater Directory*. Mark your changes on the forms provided in the back of the 1989-90 *Repeater Directory*. Repeater updates should be submitted directly to the coordinator for your area; however, packet and beacon changes may be sent directly to *Repeater Directory* Editor Jay Mabey, NU0X, at ARRL HQ.

The ARRL/VEC has reached another landmark. On September 27, 1989, the ARRL/VEC processed examination session number 10,000. The session was conducted by the Grand Rapids (MI) Amateur Radio Association. More than 121,000 candidates have been served by the ARRL/VEC.

It's time again for one of the most popular ARRL operating events—***ARRL November Sweepstakes!*** CW Sweepstakes will be held November 4-5 and Phone Sweepstakes will be held November 18-19. For forms, send an SASE with 45 cents postage to ARRL HQ. The Sweepstakes announcement can be found on page 83 of October *QST*.

Following several days of test transmissions, W1AW began operating on its regular schedule from the renovated station on September 28. As announced in July *QST*, CW operation has been moved to 14,047.5 kHz on 20 meters and 7,047.5 kHz on 40 meters. Voice transmissions will be sent at 0245 and 0545 UTC. A complete W1AW operating schedule can be found on page 80.

Here's a job opening at HQ that doesn't come along very often: ***Chief Operator and W1AW Station Manager.*** Technical and computer skills as well as background in management are required. Starting salary range: \$26,000-28,000. Send resumes to Membership Communications Services Manager John Lindholm, W1XX, at ARRL HQ.

One of the benefits of ARRL membership is the availability of low-cost equipment insurance to members. The cost is \$1.25 per \$100 of replacement cost value plus a \$5 administrative fee. Send a SASE to ARRL HQ for an application.

White Water Portable

They made the contact that counted, in spite of poor propagation.

By Michael Dale

4707 East Kings Ave
Phoenix, AZ 85032

When Kevin Swesey, KA7GQX, asked if he could paddle along on a trip we had planned over the Memorial Day weekend, I said, "Why not?" My partner, Kim Swesey (his brother), and I planned an eight-man, four-canoe trip down the rugged Verde River in central Arizona. Two nights and three days of excitement for our crew and a world of entertainment supplied by KA7GQX making contacts sounded like fun.

Paddling canoes in class two and class three white water is a lot of fun, especially in Arizona where you'll see cacti in bloom, eagles' nests located on sheer cliffs and beautiful cottonwood trees along virgin fishing waters. Gliding down river rapids in a canoe is not the most stable place to operate a radio, so we agreed on limiting operations to riverbank resting spots.

For our radio equipment, we used a 10-meter AR-3500 Ranger with a dipole. For local contacts we brought along a hand-held and a home-brew, four-element cubical quad, as we would need maximum gain to get out of deep canyons and sheer cliffs.

Our power supply was a marine battery rated at 60 Ah tied down under the back seat of the canoe. That seat was assigned to the lightest crew member. Operating one hour each morning, one hour at noon and starting in again at 5:00 PM until band closing, we estimated that the battery would last the whole trip. All of our radio gear, along with cameras, personal effects and other necessary equipment was stowed in waterproof bags and tied to the canoes in the event we capsized.

We arrived at Childs, Arizona (our launch site), on Friday evening to camp overnight. Our families came along to cook, watch the launch and drive vehicles back over the switchback trail to Phoenix. Kevin tried out the AR-3500 in early evening but was unable to make a contact. Solar flares were disrupting the band, and we all hoped that conditions would improve the next day.

The morning light danced across my eyelids as I stirred from a deep slumber. Raising up on one elbow, I looked out at the four canoes that would embark us on waters of adventure. The slow awakening of our campers escalated as breakfast began to perk along with the coffee. While the

canoeists were being teased with the tantalizing odors of all that good food, they were busy loading equipment. Our radioman was excused from this activity, as he tried once again to make some contacts, but the band was still dead.

Now it was time to hit the water and start paddling. The first rapids were only 200 yards downstream. Everyone that wasn't in a canoe rushed ahead to watch the crews shoot through the narrow opening that was fortified on each side with huge boulders.

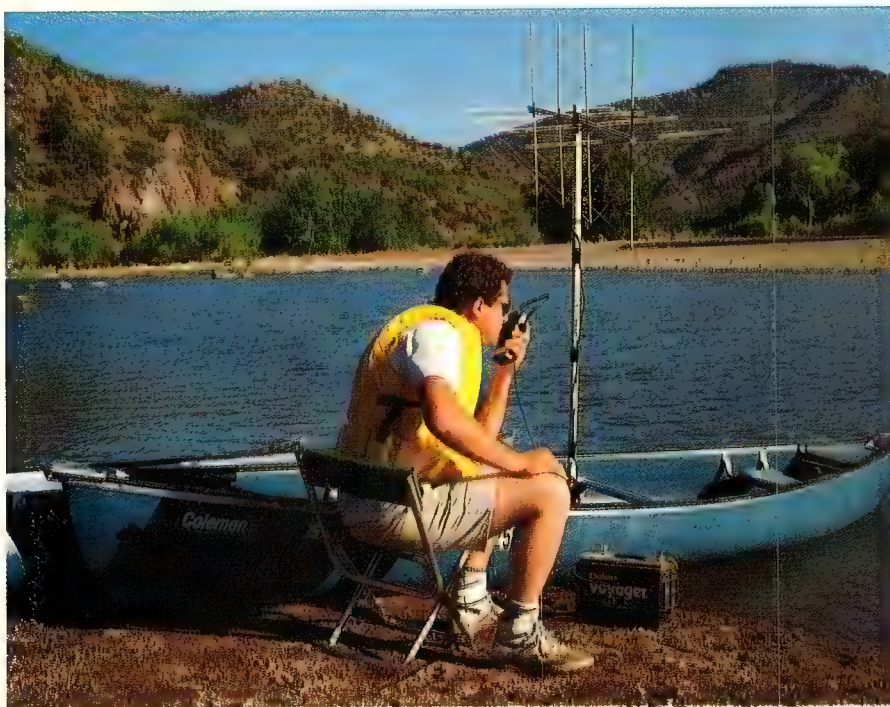
The first canoe made it through as though they had done this a hundred times. The second canoe, where Kevin and all the radio

gear was riding made it through with flying colors, but then bashed against the rock-bordered bank and swamped. The third and fourth canoes also swamped. We soon discovered, that vital to our success on this trip, were our state-of-the-art canoes and waterproof bags. The ultralight canoes and transport bags made it possible to carry the added weight of the radio and battery over rough water and keep it bone dry in spite of frequent swamping.

There was only one place to make our first stop, and that was where sheer cliffs rise several hundred feet and the river makes a sharp right turn. We landed here for a



Kevin Swesey, KA7GQX, makes contacts on 10 meters at a remote site on the Verde River in central Arizona. (photos by author)



Even with the 2-meter cubical quad, it was difficult to get a signal out of the deep canyon and surrounding mountains.

breather and discovered an eagle's nest perched on an overlooking jutting rock high on the cliff. In our excitement to take pictures of the fledgling eagles with their parents flying overhead, we completely forgot about the noon schedule to transmit.

After making our first campsite, unloading the canoes and equipment only took a few minutes. Kevin found a couple of trees, spread out the dipole antenna and started scanning the band. For the next 30 minutes we heard nothing but static and background noise. Kevin also tried the 2-meter handheld, but even with the quad plugged in, he wasn't making any contacts.

In the early stages of planning this trip, Kevin started passing the word along to his fellow operators to tune in on this adventure. Now we wondered how many were actually listening. The solar flares kept it a secret, so we shut down until our next stop.

On the second day we paddled down a fast stream of rapids with plenty of action and thrills. The high winds we were encountering presented us with special concerns. Our support crew was due to pick us up at Horseshoe Dam on the third day, but because of the wind we were beginning to doubt that we could make it that far. It became increasingly important to make contact with someone who could relay a message for the support crew to change the pick-up point further upstream to Sheep Bridge.

We stopped more frequently than planned so Kevin could try to raise someone, but no one could hear him. We finally made our second campsite, and Kevin dug out the 10-meter rig again. He called CQ for a solid hour. Making radio contact took on a desperation, but it was either that, or we

would all have a long, long hike from Sheep Bridge after a punishing three days on the river. More importantly, we didn't want to worry the support crew by not being at the designated pick-up point on time.

At the last minute, Kevin decided to give it one more try and heard some Australian stations on the band. Then it happened! We heard KA7 GOLF QUEBEC X-RAY, WHAT SAY MATEY? CAN YOU HEAR ME? Kevin gave him a fast response, and we had our first contact. Kevin explained our situation to Dick Webb, VK3AHT, who offered his help from Melbourne, Australia. We could only hope that he was successful in getting a message to Phoenix.

Our day-long battle with the fierce winds had taken its toll. We nibbled on our supper and called it a day. I'm sure each man's last thoughts that night was of what lay ahead of us the next day, soothed only by the dim hope that our support crew would be at Sheep Bridge...and that somehow our Australian contact would work the miracle to save us from another grueling day against the wind.

At dawn on the third day out, our entire crew was showing wear and tear from the demons of Mother Nature. Sunglasses, hats and sunscreen were all necessary equipment. Our long-sleeved shirts, kept wet for cooling purposes, seemed to bake under the unrelenting sun. One of the crew suffered painfully sunburned ears because his hat did not have a brim. Although the wind had died down during the night, it was beginning to pick up again, and we knew we were in for another day of fighting the elements.

At the noon stop, Kevin tried again to make contact with anyone on 2 or 10 meters, but to no avail. We gave up and



The marine battery was stored under the aft seat of the canoe. Other equipment included a 10-meter transceiver and a dipole.

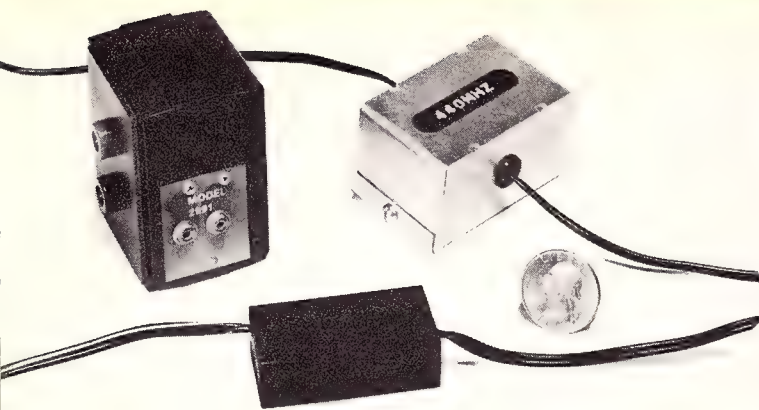
pushed on against the wind...always against the wind. The only thing that kept us going was looking for the bridge. Around every turn we expected to see it, only to find more river and another turn. Finally, one of the oarsmen in the lead canoe bellowed out, "I smell barbecue!" Take my word for it, the paddling speed picked up considerably. Just around the next turn we spotted our support crew cheering us to shore.

It was late afternoon, and the wind had helped time our arrival just right. We had not kept the support crew waiting long. Nothing had ever looked better than those people resting against the vehicles, framed by the smoke of a campfire cooking up big, juicy hamburgers—and plenty of them, along with lots of cold drinks. After greetings and handshakes, we asked how contact had been made.

VK3AHT from Australia had made contact with David Oustayan, KC6BFM, in Inglewood, California. KC6BFM then made a collect call to Phoenix to our crew chief's wife, informing her of the new pick-up destination and time. I am never surprised, but always gratified to know that an amateur has handled a critical relay message. Both of these operators responded in a professional and timely manner to rescue us from our dilemma. We were all very grateful and let them know with QSL cards just how much it meant to us.

Speaking of QSL cards—we had a quantity of them printed specifically for this trip that were never used, so if you'd like to have one, just let us know. You can't take credit for a contact, but it will sure serve as a reminder to make careful plans before going canoeing in remote areas—such as taking along a transceiver. As for the sun, the wind, and the solar flares, well, you know what they say about the best laid plans of mice and men...gosh, we sure did have fun.

QST



An Adapter for Powering Hand-Held Rigs from 12-V Sources

Still using NiCd batteries for all your hand-held-radio work? A lead-acid power source is much more versatile—when used in conjunction with this adapter.

By Mitchell Lee, KB6FPW

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2900 Semiconductor Dr
Santa Clara, CA 95052

The title photo: Three versions of the adapter described in this article are pictured. One, for powering a Ten-Tec 2591 2-meter hand-held rig, is built into a spare-battery case; one for general-purpose use is constructed in a home-brew PC-board box; and one for operation of a 440-MHz FM hand-held radio fits inside a commercial aluminum enclosure.

Anyone who owns a hand-held radio knows the frustration of NiCd batteries. NiCds seem to always go dead just as you access the autopatch to report a roadside emergency to the highway patrol! After arriving at home, you face a 15-hour wait for the pack to recharge or—if you've spent the extra dollars for the convenience—a shorter wait for the fast charger to do its thing.

Have you ever wanted to take your hand-held rig on a camping trip, or on a weekend drive, only to remember (too late) that your battery is half discharged? Wouldn't it be nice to top off the charge before leaving? But we've all been warned about the damage caused by recharging a half-used NiCd battery: the cells develop *memory*, and won't hold a full charge.

The result of situations like these is that nearly everyone with a hand-held rig owns two or more battery packs for each radio. These battery packs are rotated with each charge/discharge cycle. Because a period of inactivity can do serious damage to the cells, the best treatment for NiCds is to use them regularly.

Although NiCds are indispensable for most casual operation, lead-acid batteries are perfect hand-held-rig power sources for extended emergency, fixed, or mobile operation. A fully charged lead-acid battery is almost always available in the car. For extended emergency operation, such as at a fire station or a hospital, a so-called maintenance-free car battery serves well. Such a battery can be float charged indefinitely without requiring electrolyte-level maintenance, and, when an emergency arises, the battery can power not only hand-

held transceivers, but also higher-powered mobile rigs or "brick" amplifiers. For these reasons, many emergency operating positions are equipped with such batteries.

For portable operation, 12-V, gelled-electrolyte cells are available in a variety of sizes ranging from 1 Ah (equivalent to a very large NiCd battery) to 40 Ah (about the same as a small car battery). Batteries with capacities of up to 2.5 Ah can be comfortably attached to a belt, and those capable of storing as much as 12 Ah can be considered backpack portable. Larger-size gelled-electrolyte batteries are also transportable, to the extent that most people can carry one 100 yards or so from the car to a campsite. Small gelled-electrolyte batteries (1 to 2.5 Ah) are especially attractive in pedestrian-portable applications, because they are virtually infinite energy sources for hand-held rigs.

One big disadvantage of NiCds is their relatively flat voltage-v-discharge characteristic: The voltage doesn't sag until the bitter end, when the output drops dramatically and without warning, suddenly rendering a NiCd-powered radio completely inoperable. In contrast, the output voltage of lead-acid batteries drops gradually throughout the discharge cycle, and the state of charge is easily determined from the cell voltage (see the sidebar, "Terminal Voltage Reveals State of Charge").

Unfortunately, lead-acid batteries don't fit in standard battery cases; a 12-V, 1-Ah gelled-electrolyte battery is bigger than most hand-held rigs. Smaller-capacity cells

are difficult to manufacture, and there is no small-size lead-acid equivalent to the tiny NiCds used in typical battery packs. Also, cell voltage differs between NiCds and lead-acid batteries. Therefore, batteries of the two types cannot be directly interchanged. For these reasons, gelled-electrolyte batteries have not found their way into hand-held-rig battery cases.

Groups of three and six cells (6 and 12 V) are the most common configurations for both liquid- and gelled-electrolyte batteries. In most cases, hams need 12-V batteries, as few hand-held rigs operate on 6 V or less. Because of the bulk of the battery, it is external to the radio. Many hand-held rigs don't operate directly from 12 V, either; some means of dropping the voltage to the level required by the hand-held rig is necessary. For this purpose, a one-chip, adjustable voltage regulator can be used.

NPN Voltage Regulators

The operating voltages of hand-held radios vary from model to model, and from manufacturer to manufacturer. There are several adjustable-regulator ICs on the market (such as the LM317 and LM350) that meet the voltage and current demands of the average hand-held rig, but few can tolerate the electrical requirements of lead-acid batteries.

The voltage of a lead-acid battery fluctuates over a 30% range, depending on whether the battery is being charged or discharged, and on the state of charge. The regulator must maintain regulation while

Terminal Voltage Reveals State of Charge

Lead-acid batteries have a built-in charge indicator: their open-circuit (unloaded) voltage! The graph (Fig A) relates open-circuit, at-rest battery voltage to the charge percentage remaining in the battery. (For a battery to be considered *at rest*, it must have been unloaded for at least 24 hours.) To determine the amount of charge left in your battery, simply measure the terminal voltage (a 3½ digit DMM is recommended) and check it against Fig A.

Various factors affect the discharge curve. If the battery is under load, the voltage for any given percentage capacity will be less than that shown. This difference ranges from 200 mV for light loading (100 mA drain from a 1-Ah battery), to 1 V for a heavy load (1 A from a 1-Ah battery).

The curve is relative, because the actual battery capacity is dependent on the discharge schedule. High discharge rates at a high duty cycle reduce the effective ampere-hour capacity of the battery. For instance, although a particular battery might be rated for 2.5 Ah at a 0.2-A discharge rate, the capacity might drop to 1.5 Ah at higher discharge rates. A measurement that indicates 30% remaining capacity is valid, but 30% of what? That depends on how you

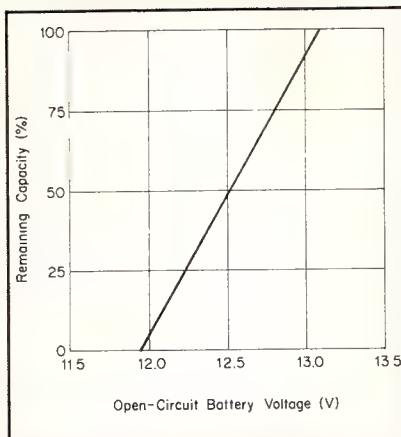


Fig A

intend to discharge the remaining 30% of the battery's capacity.

Open-circuit voltage is directly affected by the specific gravity of the battery's electrolyte, which in turn varies with battery type. Signaling batteries designed for standby service typically have lower electrolyte specific gravities than deep-discharge batteries, resulting in slightly lower output voltages for the signaling types. For exact output voltage figures for your battery, check the manufacturer's specification sheet.—KB6FPW

resistors, and can be used in place of a nine-cell NiCd battery. Although the regulator is short-circuit-proof, and automatically shuts down if it overheats, it cannot stand inverted source polarity or high-voltage transients such as a load-dump condition (a slow, high-voltage transient produced by the charging system [see the sidebar, "A Voltage-Regulator Vocabulary Primer"]). These conditions could destroy the regulator—and possibly the load—if no external protection is provided.

To protect the regulator and the load, several components are added to the input. The blocking diode isolates the regulator from negative inputs, such as a backwards-connected battery. Without this diode, a negative input would be coupled directly through the internal substrate diode to the output. Under such conditions, it would be a race to see whether the 3-A fuse, regulator or hand-held rig would blow up first!

To catch load dumps and fast transients, a low-resistance inductor, a 27-V Zener diode and an electrolytic capacitor are added. In combination, these components limit and absorb overvoltage conditions at the input. As is necessary for any circuit connected to a lead-acid battery, a fuse is placed in line near the battery to protect against catastrophic malfunctions. This seems like a lot of work for a simple adapter!

A less obvious drawback is the resultant dropout voltage: If the load draws 0.5 A, the regulator needs at least a 1.7-V input-to-output differential to maintain output-voltage regulation. Add to this the drops in the 1N4004 (0.8 V), choke (0.5 V), and wiring (0.1 V), and the input must be 13.9 V or greater to maintain a 10.8-V output. That's equivalent to a 12-V lead-acid battery under charge (in a vehicle with the

handling the minimum and maximum input voltages. Also, charging systems (especially those in vehicles) can produce voltage spikes. In use, the regulator could be connected to the battery backwards, or the wrong voltage might be inadvertently con-

nected to the input terminals. The regulator must not only survive these conditions, but also protect the load from destruction.

Fig 1 shows a regulator based on a conventional NPN device, the LM317T. The output voltage is set to 10.8 V using 1%

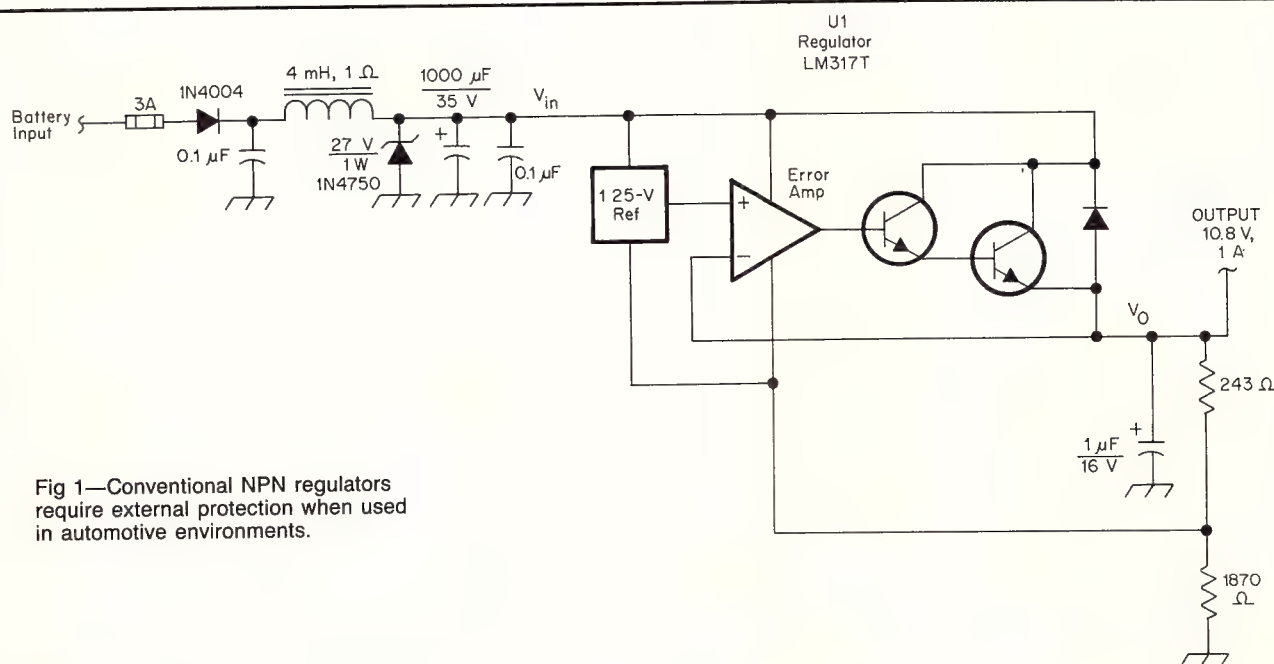


Fig 1—Conventional NPN regulators require external protection when used in automotive environments.

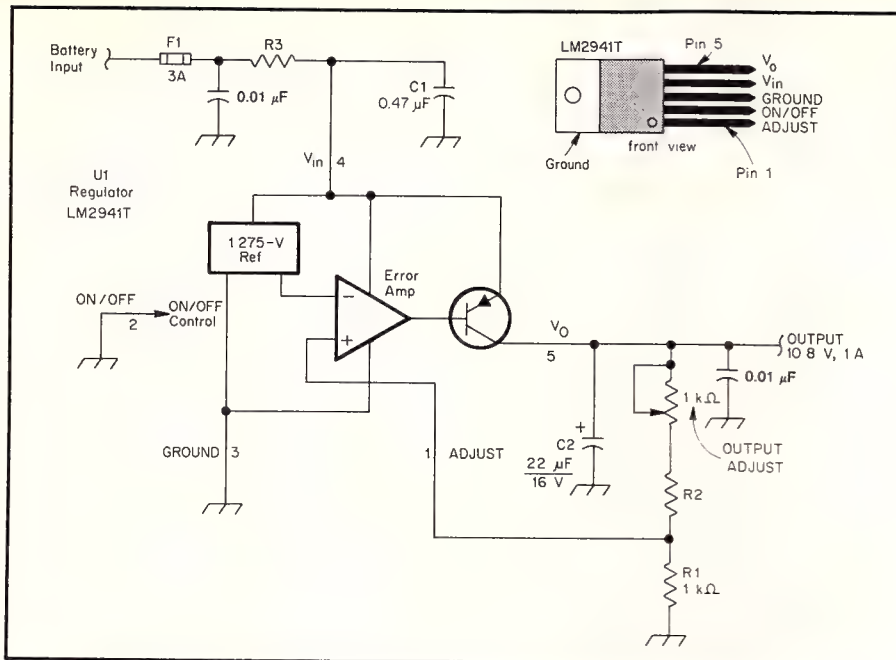


Fig 2—Schematic of the regulator. The output voltage is set by R1 and R2. R3 (2 W, wirewound) is optional, but provides RF filtering and, in the case of lower output voltages (high input-to-output voltage differentials, in which the regulator must dissipate considerable unwanted energy), R3 helps by dissipating some power. The 1-kΩ trimmer in series with R2 is also optional; if included, it allows fine-output-voltage-adjustment capability. Place C1 and C2 as close to the IC as possible, and keep lead lengths to a minimum. Do not bypass R1 or R2; instability may result. Also, if you alter the value of C2, do not decrease it below 22 μF—again, instability could be a problem.

C1—0.47 μF, 100 V, polyester film.

C2—22 μF, 16 V, tantalum.

F1—3-A in-line fuse; RS no. 270-1276.

R1, R2—1% metal-film resistors; available from Circuit Specialists and Digi-Key®.

See text and Table 1.

R3—See text and Table 1. Digi-Key “5% wire-wound rectangular resistors,” Circuit Specialists nos. PW2 and PW5, RS no. 271-130 acceptable.

U1—National Semiconductor LM2941T; Jameco®, Circuit Specialists.

Suppliers:

Digi-Key Corporation, 701 Brooks Ave S, PO Box 677, Thief River Falls, MN 56701-0677, tel 800-344-4539.

Jameco Electronics, 1355 Shoreway Rd, Belmont, CA 94002, tel 415-592-8097.

Circuit Specialists, Inc, PO Box 3047, Scottsdale, AZ 85257, tel 800-528-1417.

A Voltage-Regulator Vocabulary Primer

As in any specialized field, a number of terms unique to voltage regulators have evolved. A few of the more common terms are explained here.

• **Dropout Voltage:** By definition, the input-voltage differential at which the circuit ceases to regulate against further reduction in input voltage. Technically speaking, dropout voltage is the difference between the input and the output of a regulator when the output voltage has dropped by 100 mV from the nominal value. This nominal output voltage is usually measured when the input-output differential is 5 V.

The dropout voltage of an NPN regulator is related to both saturation voltage and base-emitter drops in the Darlington pass device. PNP dropout voltage is dependent only on saturation voltage, making it at least 1 V better than that of NPN regulators.

• **Load Dump:** The easiest way to define this term is with a description of a load-dump condition. Modern cars are powered by three-phase alternators. The output of such alternators is converted from ac to dc by means of a three-phase diode bridge, and the power output is regulated by varying the current flowing in a rotating field winding. More field current makes for more power delivered to the load; less current makes for less power. Because a lead-acid battery is connected to the output of the alternator, the system voltage is held essentially constant.

Alternator field windings have an inductance on the order of 1 H, preventing fast changes in field current. If there is a rapid change in load current, the battery momentarily acts as a reservoir to either absorb or supply the changing load demand. Long-term demands are met by the action of the alternator's regulator. The division of fast and slow regulation between the battery and alternator works until the battery connections deteriorate. A significant resistance appearing in series with the battery impairs its ability to moderate rapid changes in loading.

The worst-case scenario is when the battery is nearly dead, the alternator is delivering maximum current to charge it, and a battery connection fails—such as when hitting a bump knocks an important cable loose. This is a load-dump condition: The load current drops, and—for a few hundred milliseconds—the alternator has enough field current to develop as much as 60 V across the remaining loads. This doesn't happen very often, but every electronic device in a modern automobile is designed to survive load dump.

A load-dump transient is slow, with a 1- or 2-ms time constant on its rising edge and 50- to 200-ms time constant on its falling edge. Much faster transients exist as a result of inductances in series with the battery. Although the battery can absorb fast changes, series inductance contributed by wiring increases the effective battery impedance at high frequencies. These transients are handled in the 12-V adapter (see Fig 2) by C1 and the 60-V capability of the LM2941T.

• **PNP Regulator:** Low-dropout regulators are sometimes referred to simply as PNP regulators, because the pass devices in such regulators are PNP transistors. As a consequence, the contrasting term *NPN regulator* has been coined to describe conventional regulators that exhibit higher dropout voltages.—KB6FPW

engine running).

For a more realistic input voltage—let's say 11.8 V for a lightly loaded battery near the end of its discharge cycle—the regulator could provide an output of 8.7 V, roughly equivalent to a seven-cell NiCd battery. The circuit in Fig 1 just won't work for hand-held rigs that use eight- or nine-cell batteries. If the lead-acid battery is under heavy load (simultaneously powering an HF rig, VHF rig and/or brick), its output will drop below 11 V at the end of the discharge cycle, and the regulator will barely work in the place of a six-cell battery.

PNP Regulation

Another regulator topology, one based on a series-PNP pass device, overcomes the voltage-drop and delicacy problems associated with NPN regulators. This type of regulator, shown in Fig 2, was developed for automotive applications. Such circuits are called low-dropout regulators, because the dropout point is simply the saturation voltage of the PNP pass device. For the device shown, the new LM2941T, that requirement is only 270 mV at a load current of 0.5 A.

A second advantage of PNP over NPN regulators is that no extra headroom is required to operate the error amplifier and reference, because these subcircuits are powered from the full input voltage—not

Table 1

Values for R2 based on the type and number of cells to be replaced. R1 is 1 k Ω , 1% tolerance, metal film, ½ W.

Number of Cells NiCd (1.25 V ea)	LeClanche (1.5 V ea)	Total Voltage	R2 (without trimmer)	R2 (with trimmer)	R3
5	4	6.0	3.74 k Ω	3.3 k Ω	2.2 Ω
6		7.2	4.64 k Ω	4.3 k Ω	1 Ω
	5	7.5	4.87 k Ω	4.3 k Ω	1 Ω
7		8.4	5.62 k Ω	5.1 k Ω	0.47 Ω
	6	9.0	6.04 k Ω	5.6 k Ω	0.33 Ω
8		9.6	6.49 k Ω	6.2 k Ω	0.22 Ω
9		10.8	7.5 k Ω	6.8 k Ω	0.1 Ω

the input/output differential.

The PNP base-emitter junction has a relatively high reverse-breakdown voltage and has no internal input-to-output diode, which allows it to stave off negative input voltages with ease. Note that the emitter turns into a reverse-biased diode with negative inputs, effectively isolating the load. The error-amplifier and reference circuits have similar structures connected to V_{in} so that they, too, are isolated from battery-reversal conditions. There is no need to use a series blocking diode with this regulator.

Better still, PNP pass devices can with-

stand 60-V transients, obviating the need for an external, power-hungry transient-suppression network. The PNP regulator is designed to survive the rigors of an automotive environment where transients, reverse-polarity inputs and marginal input voltages are commonplace. A summary of NPN and PNP regulator characteristics is shown in the sidebar, "NPN and PNP Regulators: A Comparison of Characteristics."

The LM2941 provides several configuration options, depending on your requirements. Table 1 shows appropriate values for R2 as a function of the number of

NiCds that are being replaced (R2 values for 1.5-V [LeClanche] cells are also shown). For easiest fine adjustment, add a 1-k Ω trimmer potentiometer in series with R2 and adjust it for the exact output voltage you need. If you don't like making adjustments, use 1%-tolerance resistors for R1 and R2.

Construction

The adapter circuit can be built inside a small aluminum box, using the box itself as a heat sink for the regulator. The regulator's mounting tab is at ground potential, so no insulating washers are necessary (LM317-type regulators require them). For good thermal contact, use thermally conductive grease between the mounting tab and the box. Also, make sure that the aluminum is free of paint and anodizing before mounting the device.

A small (1- × 1-inch) copper-clad PC board can be located adjacent to the pins of the regulator and held in place with glue, or a screw and nut. The components external to the regulator can be mounted on this board. If the aluminum box is used to carry ground currents from the battery to the load, make sure that there is a solid connection between the PC board and the box. Solder pin 3 (ground) to the PC board as well.

The LM2941 can deliver at least 1 A—plenty for most hand-held radios. Under short-circuit conditions, the output is in excess of 1.6 A.

After saying all of those bad things about external protection circuitry, I included a resistor (R3) in series with the input of the regulator. The purpose of this resistor is different than that of the resistive choke shown in Fig 1. R3 (Fig 2) is optional, but it can provide two major performance enhancements: First, it dissipates some power (this is helpful for the lower-output-voltage applications), and second, because R3 is a wire-wound resistor, it has inductance that helps filter RF noise from the regulator input.

Two- or five-watt, wire-wound resistors typically resonate above the HF region, providing a very effective, low-Q RF choke. At 144 MHz, a 0.1- Ω wire-wound resistor has about a 50- Ω impedance. Additional RF filtering is provided by 0.01- μ F bypass capacitors at the points where the input and output leads enter and leave the box. Although the bypass capacitors and inductive power resistor are optional, they should be given serious consideration if the adapter is going to be used in the vicinity of high-power amplifiers.

C1 and C2 stabilize the regulator and enhance its transient-immunity and regulation characteristics. These capacitors should be located very close to the regulator IC, preferably within ½ inch. Solder them directly to the regulator pins if possible, cutting the capacitor leads to minimum length. C1 should be a small polyester-film

NPN and PNP Regulators: A Comparison of Characteristics

Table A is a comparison of the features found in typical NPN and PNP voltage regulators. The LM317 and LM2941 are used as examples. An explanation of these features is included below.

• **Short-circuit current limiting:** All modern, monolithic voltage regulators include current-sensing circuits to monitor output current and to limit it to a safe (nondestructive) value. When the current limit is reached, the

output voltage is no longer regulated. The limit current is usually 150% or more of rated output current.

• **Thermal shutdown:** Excessive power dissipation is a leading cause of destruction of ICs, so many power ICs incorporate thermal-shutdown circuits to protect the devices in the event of excessive heat. This is standard issue for voltage regulators. If a regulator is momentarily shorted, the short-circuit current limit will protect it from destruction. If the short persists, the device will heat up and the thermal-shutdown circuit will trip, further protecting the device.

• **Overvoltage shutdown:** To guard against high-voltage, safe-operating-area (SOA) failures in a regulator's pass device, an overvoltage circuit senses the input voltage and shuts the regulator off at between 26 and 36 V.

• **Reverse-battery protection:** In portable and automotive equipment, there is a remote chance that someday, someone will replace a battery backwards. To guard against the destruction of the regulator and its load in such a case, a blocking diode must be included in series with the power lead. In the case of a PNP regulator, the emitter of the pass device provides reverse-battery protection, obviating the need for an external diode.—KB6FPW

Table A

NPN/PNP Regulator Feature Comparison

Characteristic	NPN (LM317T)	PNP (LM2941T)
Short-circuit current limit	Yes	Yes
Thermal shutdown	Yes	Yes
Overvoltage shutdown	No	Yes
Reverse-battery protection	No	Yes
Dropout at:		
50 mA	1.6 V	60 mV
500 mA	1.8 V	270 mV
1 A	2.0 V	500 mV
Maximum input voltage	40 V	60 V

(Mylar® is suitable) unit, and tantalum is best for C2.

One final note concerning construction techniques: Think about the consequences of high G forces, such as when the adapter is dropped on concrete. Don't leave any components flopping around at the ends of long leads, and don't allow heavy parts such as R3 to stress other, more fragile components.

Operation

The LM2941 uses the internal circuit topology shown in Fig 2. The error amplifier senses the voltage at the **ADJUST** pin and increases drive to the PNP pass device until the adjust voltage (as derived from the output by the divider) matches the internal (1.275-V) reference. The LM2941T exhibits excellent temperature stability (40 parts in 10⁶ per °C) and the device has an overvoltage monitor that turns off the regulator when the input potential exceeds a preset limit (30 V).

A feature not used in this application is the LM2941T's **ON/OFF** switch. Pin 2 is a TTL-compatible control line that can be used, by a microprocessor or another device, to turn the regulator on and off. As shown, the regulator is hard-wired in the **ON** position (pin 2 is grounded). If pin 2 is pulled above 1.275 V, the regulator will turn off. It's possible to have a computer turn a rig on and off by means of this line, for use in a packet-radio station, for example.

Setup

Before connecting the adapter to a power source, double-check all your wiring. Don't connect a load yet. If everything looks okay, connect a voltmeter to the output and apply power to the input. If the output isn't about what you expected, check the wiring again, and check resistor values. In particular, make sure that R1 and R2 aren't transposed, and that the regulator pins are correctly connected. If you installed a 1-k Ω trimmer in series with R2, it will give an adjustment range of approximately ± 0.5 V, and can be used to set the output once the circuit is working.

Try connecting a 10- or 20- Ω power resistor (a no. 93 desk-lamp bulb or no. 1157 automotive lamp are good substitutes) to the output while watching for changes in the output voltage. The output should change less than 50 mV from no load to full load. You may want to leave the dummy load connected for a few minutes to make sure the adapter doesn't overheat. If it does, the output voltage will fall, but it will recover once the regulator cools down. In extreme applications, such as sustained 1-A load, 14.4 V input, low output voltage (4.5 to 6 V), and very hot operating environment, you may want to add a small heat sink to the regulator.

If you want to see the regulator's protection features in action, try shorting the output, or connect the battery backwards. Monitor the output current for the short-circuit test, and the load voltage for the reversed-input test. The regulator will recover from both faults, although it may take a moment to do so if the device's thermal-shutdown threshold is reached during the short-circuit test.

Once you have convinced yourself that the circuit is working properly—and that it's foolproof—it is ready for use with your hand-held rig.

Interconnections

Use a connector at both the input and output of the adapter. At the battery end, any of several different available connectors will work fine. Two-conductor quick-change connectors (Radio Shack® 270-026 or 270-025) work well in this service and, if the adapter is being used only in an automotive environment, a cigarette-lighter adapter (Radio Shack 274-331 [unfused] or 274-335 [fused]) is a good choice. For versatility, banana plugs can't be beat; because of the risk of short circuits, though, they're not recommended for direct connection to a car battery.

Above all else, make sure you include an in-line fuse at or near the connection to the battery. A fuse provides safety in the event of pinched wires, in-the-dark blundering, and catastrophic failure of the adapter.

Connections at the radio end of the adapter will vary according to the requirements of the hand-held rig. Some use 2.5- or 3.5-mm audio connectors, and others use barrel connectors. It is also possible to build the adapter into an empty battery case.

One important precaution: *Do not* connect the adapter output across the NiCd's normally used with your hand-held rig! Similarly, do not connect the adapter to the rig's charger input (separate charger- and supply-input connectors are often provided on battery cases and radios). Most hand-held rigs switch NiCd's out of the circuit when power is applied to an external-supply input. Consult your rig's manual for appropriate voltages and connections. Also, be sure to observe the polarity of the rig's power connector—there is no standard.


Some rigs are not designed for connection to external power sources. My Ten-Tec 2591 2-meter hand-held radio is one such rig; for it, I purchased an empty battery case and assembled the entire regulator inside the empty case (see the title photo). In that adapter, the LM2941T's heat sink/mounting tab is attached directly to the **GROUND** connector for heat sinking.

Summary

The adapter described here is handy not only for mobile, portable and emergency

communications, but also for powering incompatible hand-held radios from one 12-V battery. You may want to install an adapter permanently in your car to reduce some of the wiring clutter associated with taking a hand-held radio along for a ride.

Mitchell Lee, Extra Class ham and former applications engineer for National Semiconductor in Santa Clara, California, earned a BSEE from California Polytechnic State University in 1988. He has also attended Central Manchester College (Manchester, England), Fresno City College and California State University, Fresno.

Mitchell's operating interests include Field Day and AM on the 2, 6, 10, 40 and 160-meter bands, and CW on 30 meters. He also maintains a beacon, MEL, on the 1750-meter band. Mitchell's other interests include photography, writing, motorcycles, fourth-season mountaineering and industrial music. He plays violoncello in a local symphony orchestra. Mitchell was formerly VK4CFL, and his father, Ed, is KB6JQK. 

New Products

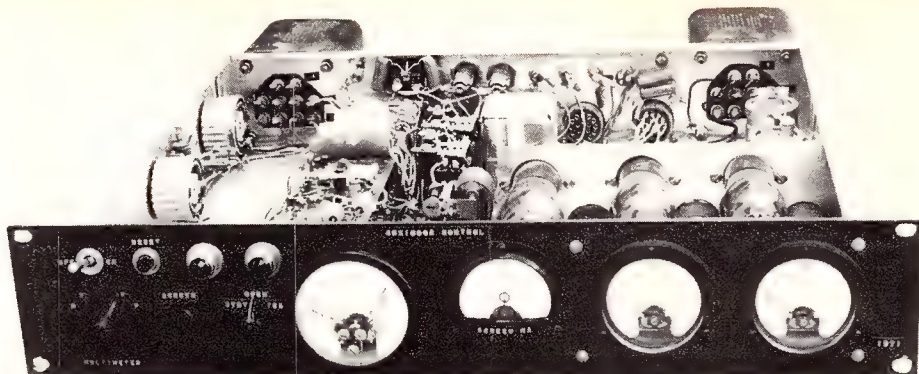
PALOMAR ENGINEERS 2-kW BALUNS

□ Palomar Engineers has introduced a line of baluns for the 2- through 30-MHz range. Dubbed the MB series, these baluns are rated for 2 kW CW and 6 kW PEP, have 50- Ω inputs, and are available with female-UHF (Teflon® -dielectric) or N input jacks. Output connectors are conical standoff insulators, and available output impedances are 50, 75, 100, 150, 200, 300, 450 and 600 Ω .

The MB series baluns are housed in epoxy-filled, cast-aluminum enclosures, and are weatherproof. Price range: \$100 to \$165. For more information, contact Palomar Engineers, PO Box 455, Escondido, CA 92025, tel 619-747-3343.—Rus Healy, NJ2L



Protecting Power Tetrodes



Lengthen tube life by using these foolproof control-circuit ideas.

By Mark Mandelkern, KN5S
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Despite the popularity of the latest cathode-driven, power-triode amplifier circuits, many builders still prefer to use tetrodes. Tetrodes are not only less expensive at flea markets than the newer triodes, but they require much less drive. In a grid-driven circuit, fewer band-switch decks are required for wide-frequency-coverage operation, because a passive input circuit eliminates the need for switching tuned input circuits. The low drive requirement is especially useful at VHF; high gain and the avoidance of tuned input circuits can more than compensate for the control- and screen-grid bias supplies required by tetrodes.¹

Properly used, tetrodes are very rugged. I used one 4CX1000A in a 1.8- to 54-MHz amplifier for 17 years with no drop in power output. I removed that tube from service last year only to test a new (flea-market-purchased) tube, and to begin a tube-rotation schedule. Tube rotation can help avoid failure of the ceramic-metal seals in these tubes. The old tube will get its turn again next year.

Tetrodes *require* adequate protection circuits; they are easily destroyed—in an instant—if run beyond their grid and screen ratings. My old tube lasted so long only because it was protected by the circuits in the control panel that I'll describe in this article. I designed this circuit for my 4CX1000A amplifier, but the circuit ideas can be used with any tetrode. To modify my design, you'll need some knowledge of the amplifier circuitry and access to the manufacturer's data for the tube you're using.

I built my amplifier in three sections: RF deck, control and metering circuits, and

high-voltage (HV) supply. I built the control circuit separately so I could build additional RF decks for the VHF and UHF bands—without duplicating all the protection and metering circuits. The control panel can be connected to several amplifiers at the same time, but only one of the amplifiers can transmit at any time.

Similarly, one HV supply can be used to power several amplifiers: I've done this without trouble for 18 years, although one of the two connected amplifiers in my setup is usually not powered. When both are powered, grid-bias-standby switching keeps the unused amplifier cut off.

A partial schematic of my amplifier, in-

Never tune a tetrode amplifier for maximum output!

cluding the control and metering circuits, is shown in Fig 1. Although the RF deck and control circuit are separate, the combined circuit is shown here so that you can more easily adapt the ideas to your amplifiers. Most of the parts required to build this circuit are available from the supplies listed in Table 1.

The word that best describes this control circuit is *foolproof*. Even holding in the **RESET** button will not enable the amplifier; the circuit resets *only* after the button is released, and *only* if the fault has been corrected. You'll hear one control relay pull in when you push in the **RESET** button, and another when you let it go. I used mechanical relays—rather than solid-

state circuits—for switching. In my experience, relays provide the most reliable protection for tubes, and are more immune to RFI.

The most crucial factor in tetrode operation is providing a stable and current-limited screen-voltage supply. Through the years, I've tried a number of different methods for doing this. Shunt regulation, I've found, is the best and easiest-to-implement method. Positive screen current is limited by regulator current, and negative screen current merely increases the current in the regulator.

Grid- and screen-current overload protection is provided by sensitive (low-current-actuated) relays. The specifications for the relays used in this circuit are relatively non-critical. I used a 1-mA-actuated relay at K1 and a 4-mA-actuated relay at K2. The suppliers listed in Table 1 carry inexpensive relays that are suitable for use in this circuit.

Although some tetrodes are designed for either class C or class AB₁ operation, others—such as the 4CX1000A—are designed only for class AB₁ operation (wherein no grid current flows). The 4CX1000A is constructed with an extremely fine grid structure, allowing for high gain; but by the same token, this tube is a candidate for an early grave if run beyond its grid-dissipation rating. In this circuit, grid-current control is obtained via ALC; the basic circuit is described in a previous article.² The ALC circuit is included in Fig 1, because I've had several requests for specific information on connecting this circuit to existing amplifiers.

The main reason for using ALC is that a class AB₁ tetrode amplifier cannot be driven into grid current without producing splatter. Therefore, ALC is one of the best ways to maintain maximum, clean output

¹Notes appear on p 25.

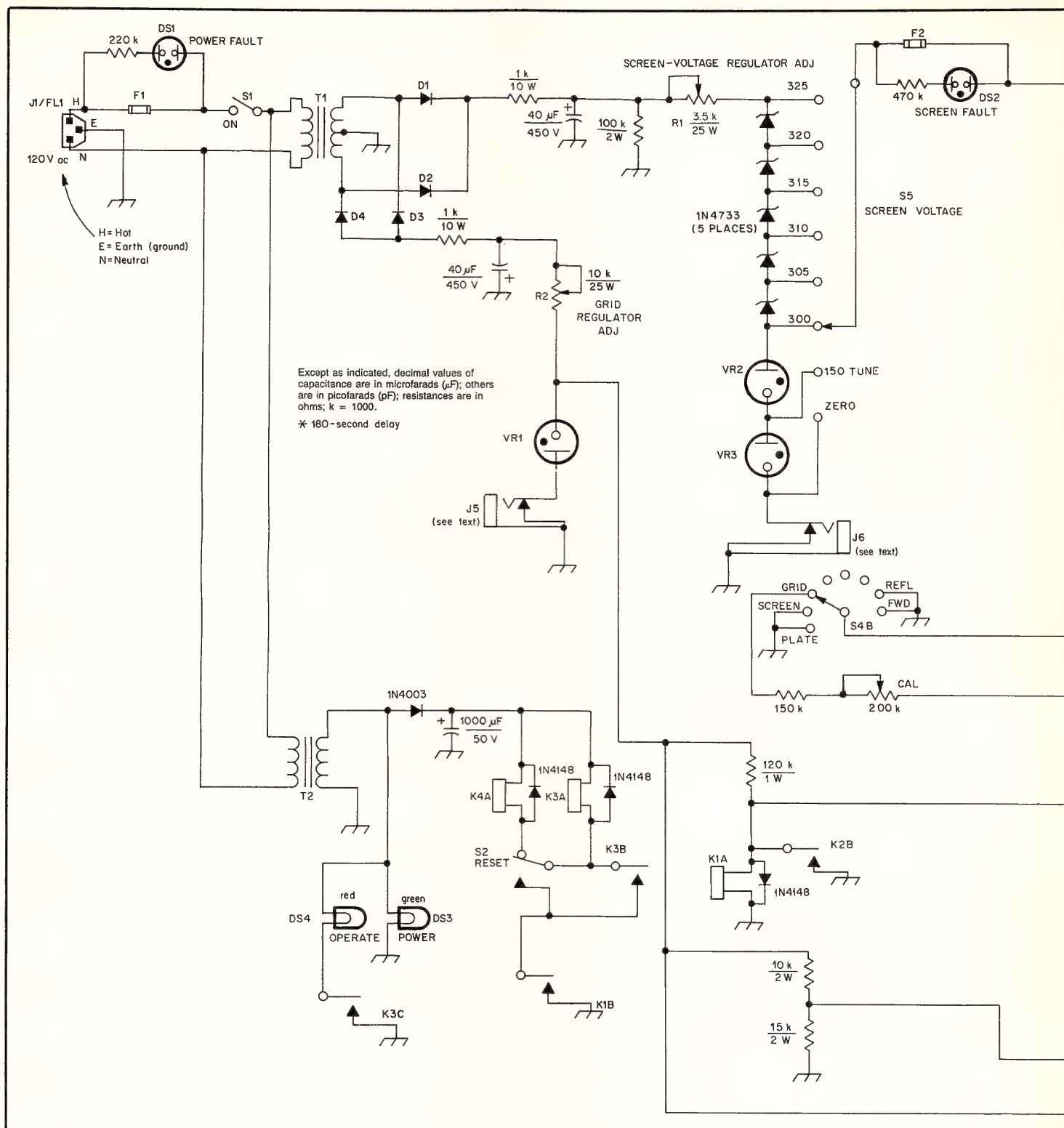


Fig 1—Tetrode-amplifier control and protection circuit, including connections to a companion amplifier. The ALC circuit shown in the shaded box is one that I described previously in *QST*. See text.

Parts List

D1-D4—Each consists of three 1N4007s in series.
 D5-D9—1N4733.
 DS1-DS2—120-V neon indicator built into fuse holder.
 DS3-DS4—12-V lamp.
 F1—4-A, slow-blow fuse.
 F2—1/8-A, fast-blow fuse.
 J1—6-A CEE-22 connector with built-in line filter (BC).

J2, J3—Phono jack.
 J5, J6—Phone jack, shorting.
 K1—1-mA-actuated, 10-k Ω -coil SPST relay.
 K2—4-mA-actuated, 750- Ω -coil SPST relay.
 K3, K4—12-V-dc-actuated DPST relay.
 M1—0-1 mA, contact-making ammeter; see text.
 S2—SPDT push-button, momentary-contact switch.
 S3—DP3T rotary switch, right-hand-position momentary contact (BC no. RO-4).

S4—Double-pole, 8-position rotary switch.
 T1—120-V primary; 800-V, 150-mA center-tapped secondary.[†]
 T2—120-V primary; 12-V, 2-A secondary.
 VR1, VR2, VR3—Voltage regulator (VR150/0D3 tube, available from Fair Radio [see Table 1]).[†]

[†]Component values may differ for amplifiers using tubes other than the 4CX1000A.

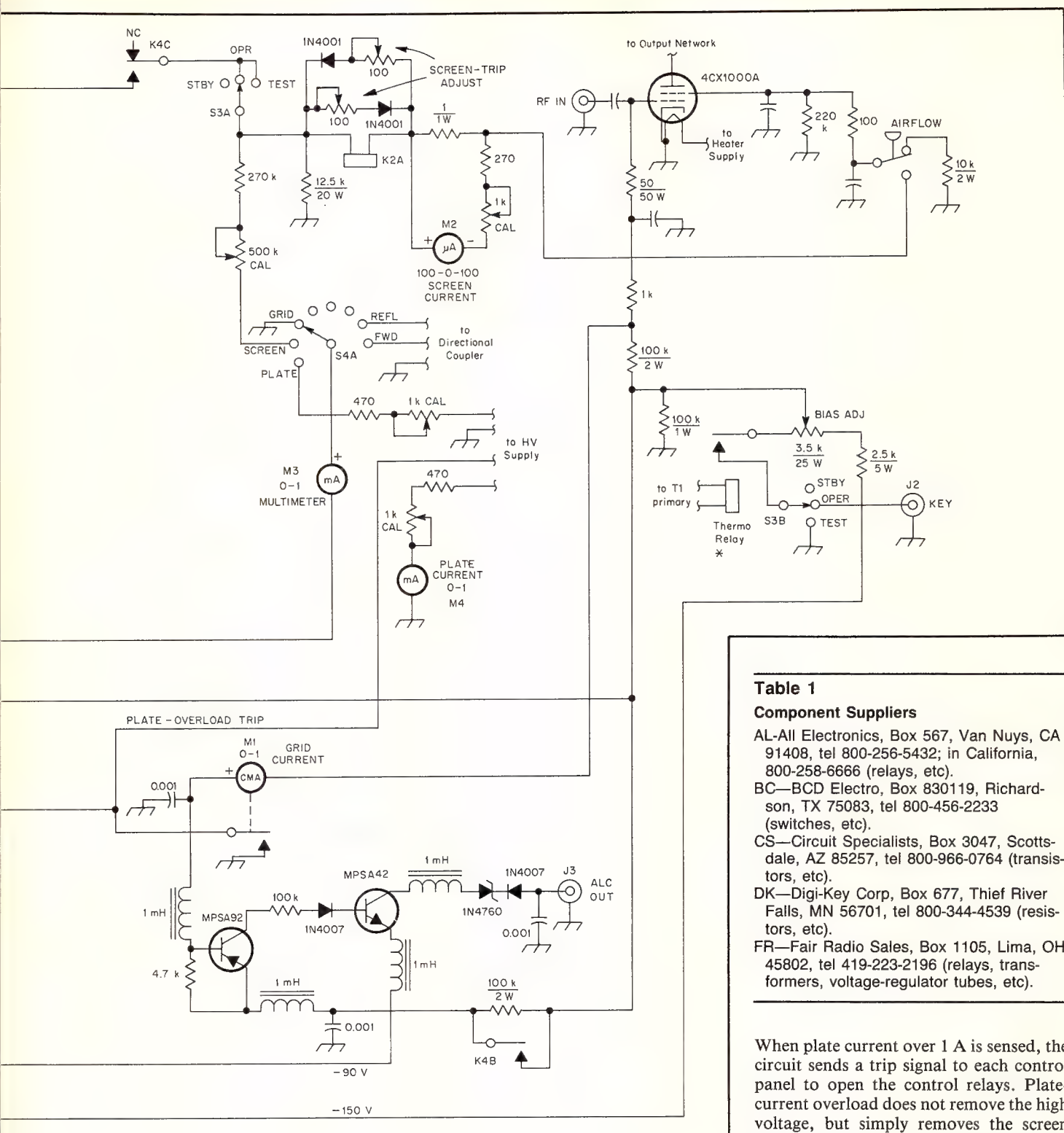


Table 1

Component Suppliers

AL—All Electronics, Box 567, Van Nuys, CA 91408, tel 800-256-5432; in California, 800-258-6666 (relays, etc).
 BC—BCD Electro, Box 830119, Richardson, TX 75083, tel 800-456-2233 (switches, etc).
 CS—Circuit Specialists, Box 3047, Scottsdale, AZ 85257, tel 800-966-0764 (transistors, etc).
 DK—Digi-Key Corp, Box 677, Thief River Falls, MN 56701, tel 800-344-4539 (resistors, etc).
 FR—Fair Radio Sales, Box 1105, Lima, OH 45802, tel 419-223-2196 (relays, transformers, voltage-regulator tubes, etc).

When plate current over 1 A is sensed, the circuit sends a trip signal to each control panel to open the control relays. Plate-current overload does not remove the high voltage, but simply removes the screen voltage. I hit on this method only after many years of trying to open the 240-V ac primary circuit under overload conditions. All I have to show for my efforts is an interesting collection of relays with welded contacts! This screen-voltage-removal method protects only the tube, however. The HV supply itself is protected from shorts and arcing by a fast-acting fuse. The fuse itself would not protect the tube from moderate plate-circuit-overload conditions, but it is *absolutely necessary* for safety.

Loss of grid bias causes both the screen

power. I believe the main reason that people believe that tetrodes, in general, produce poor-quality signals is that most tetrode amplifiers don't provide a positive method of preventing overdrive. In my amplifier-control circuit, back-up grid-current-overload protection is provided by a 1-mA meter relay. (A meter relay, also known as a contact-making or -breaking meter, is simply a meter with a set of con-

tacts that open or close at a specific meter-deflection level.) I built this amplifier several years before developing the ALC circuit, and now the meter relay isn't really necessary. If you can't find an inexpensive meter relay, you can use an ordinary meter in its place. Just be sure that your ALC is connected and working if you do this!

Plate-current-overload protection is provided by a relay in the HV supply.

and plate circuits to trip out. However, the primary line of defense against grid-bias failure is simple and automatic: The grid-bias supply powers the main control relay, K1. No grid-bias voltage, no go!

Metering

The control circuit provides dedicated metering of grid, screen and plate current. The screen-current meter is a zero-center type, because positive and negative screen-current conditions can occur during normal tetrode operation.³ A fourth meter is switched to measure grid, screen or plate voltage, or forward or reflected power (the forward- and reflected-power signals are provided by a directional coupler in the antenna line).

The expense of precision resistors is avoided by using simple, shunt-multiplier meter-calibration circuits using miniature trimmer potentiometers. For the multi-meter, I used a meter with scale markings from 0 to 6, so I adjusted the metering circuits to give full-scale readings as follows: grid, 300 V; screen, 600 V; plate, 6 kV; forward power, 2 kW; and reflected power, 200 W.

To allow compensation for minor differences between tubes, S5 is used to select screen voltages between 300 and 325, in 5-V steps. Although the 4CX1000A's data sheet specifies a typical screen voltage of 325, I get 1.5 kW output—and better linearity—with only 300 V on the screen.

To permit tune-up at decreased plate dissipation, the **TUNE** position puts 150 V on the screen. Although the **SCREEN VOLTAGE** switch's **TUNE** position is handy during tune up and for touch-up antenna tuning, the amplifier is not linear when the grid bias is set for linearity at 300- to 325-V screen operation. Therefore, S5's **TUNE** position can't be used as a means for quick power reduction during SSB operation.

Circuit Operation

When you turn on primary ac with S1, grid-bias voltage pulls in relay K1. When the **RESET** button (S2) is pushed, relay K3 pulls in; when S2 is released, relay K4 pulls in. If excessive grid current is sensed, the contacts associated with meter relay M1 close, causing K1 to drop out. This opens K3's latching circuit, causing K3 and K4 to drop out. In the event of excessive screen current, relay K2 pulls in and causes K1, K3 and K4 to drop out.

If the tube draws excessive plate current, the plate-overload relay causes the RF-deck control relays to open. When this happens, screen-grid voltage is removed from the tube. To limit grid current in this condition (to prevent tube damage if the exciter is still transmitting), a grid-bias resistor is inserted into the circuit by K4B.

This reset system has another advantage: Because it requires pushing the **RESET** button on initial startup, this control circuit protects its associated amplifier from

momentary power-line interruptions by releasing control relays K3 and K4 at the occurrence of such an interruption. This saves the amplifier from unpleasant jolts when primary power returns.

Does the control circuit ever trip out the amplifier? Only when I switch to the wrong antenna, or forget to retune after changing bands, or such foolishness. Just for laughs, I sometimes turn on the screen voltage *before* enabling the plate voltage! (This is a well-known, *big no-no* with tetrodes!) This produces screams from visiting hams, but can't hurt a tube in an amplifier that's controlled by this circuit.

For tetrodes, screen current is the best indicator of resonance and loading conditions.⁴ Don't try to tune for a plate-current dip. Resonate tetrodes by tuning for maximum screen current. In a stable, grid-driven tetrode amplifier, resonance and peak output are indicated by a peak in screen current. Adjust the loading until this screen-current peak is the value that yields maximum output. After you find the settings for maximum output, increase the loading so that the output at resonance is 5 to 10% less than the maximum available. (That last step produces a narrower signal!)

As I mentioned earlier, I suspect that some of the bad press that tetrodes have received is simply due to overdrive and improper tuning. Dave Meacham, W6EMD, said it best in a *QST* article:⁵ "Never tune a tetrode amplifier for maximum output."

Adjustments

All the control-circuit adjustments are done on the test bench, without the RF deck connected, and without high voltage applied. Because the 4CX1000A's screen grid usually runs more negative than positive, separate screen-overload-adjustment trimmers, with isolating diodes, are provided across K2A.

Set the control-grid-bias-regulator current to 38 mA (in standby), via R2, with a milliammeter attached at J5. Set the screen-regulator current to 10 mA with the control relays engaged. To do this, attach a milliammeter at J6 and adjust R1. This rather low setting provides protection for the screen. The tubes I've used never run positive screen current under normal conditions, but when the amplifier load is accidentally removed, the screen current tends to soar out of control and drives the tube into a runaway condition, resulting in quick tube destruction. With this circuit, when the screen current rises above 10 mA, the screen voltage drops rapidly.

Summary

How are the results, you ask? This control circuit and its companion 1.8- to 54-MHz amplifier have twice helped me win the SSB ARRL Sweepstakes (New Mexico Section). Using this amplifier, I once won the Rocky Mountain Division in an ARRL SSB DX contest (in the all-band

category). Using this amplifier on 6 meters in 1987, I set the current Rocky Mountain Division record in the ARRL June VHF QSO Party (with help from the 2-meter rig). I operate mostly on 6 meters, and conditions for catching a new country or grid square on six might be right for only 30 seconds—maybe a whole minute if you're lucky! For this reason, 100% reliability is required. This control circuit has maintained that performance level for the last 18 years.

Notes

¹In this article, I'll refer to the control grid and the screen grid of a tetrode as the grid and the screen, respectively, in keeping with common usage of these terms. In the same vein, I'll use *plate* in lieu of *anode*.

²M. Mandelkern, "ALC for Class AB₁ Amplifiers," *QST*, Jul 1986, pp 38-39, 47.

³D. Meacham, "Understanding Tetrode Screen Current," *QST*, Jul 1961, pp 26-29.

⁴See note 3.

⁵See note 3.

QST

New Products

MICROSYSTEMS SOFTWARE HANDYCODE AR

□ Microsystems Software, Inc., has introduced a unique software package for IBM® PC and compatible computers. HandyCODE AR provides (among others) the reverse function of countless other programs: It translates Morse code input into keystrokes, for the purpose of commanding a computer by means of CW. The program uses nonstandard Morse characters to provide user-definable functions and macros. A code-practice utility and on-line help information are included.

User-selectable parameters include code speed (from 1 to 99 WPM), iambic operation and letter/word spacing. Applications of HandyCODE AR include CW bulletin boards and computer operation by handicapped individuals. HandyCODE AR, which comes with a parallel-port connector, is available for \$149 from Microsystems Software, Inc., 600 Worcester Rd, Suite B2, Framingham, MA 01701, tel 508-626-8511. Microsystems Software accepts Visa® and MasterCard®, and HandyCODE AR has a 30-day money-back guarantee and a one-year warranty. —Rus Healy, NJ2L

An AMTOR Operating Primer

Haven't you tried AMTOR yet? Here are some guidelines to help you get started using a mode that provides impressive communications performance.

By Donald W. Huff, W6JL

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Poway, CA 92064

With the greater availability of microprocessor-based controllers in recent years, AMTOR has moved from the realm of experimentation,¹⁻⁶ to the point where AMTOR operation sometimes fills the "operator's agreement" sub-bands on 20, 15, and 10 meters on busy weekends. Based on my observations made during my AMTOR operations over the past three years, many newcomers are joining the AMTOR ranks daily. In the few years since its introduction to our hobby, a lot of radio amateurs have discovered that AMTOR is an enjoyable, nearly error-free HF communications mode.

What is AMTOR?

AMTOR is an acronym for *Amateur Teleprinting Over Radio*. AMTOR has its roots in merchant-marine MF/HF communications, where it is called SITOR (*Simplex Teleprinting Over Radio*). CCIR Recommendation 476-3 defines the standards for TOR operations that have been adopted for amateur use.⁷

AMTOR uses frequency-shift keying (FSK) or audio-frequency-shift keying (AFSK) transmission on the MF/HF bands. The FSK signal is generated directly (by keying the transmitter's carrier oscillator) or indirectly (by feeding audio-frequency-shifted tones to an SSB transmitter's audio input). If AFSK is used, the tones employed are 2125 and 2295 Hz (called the *high tones*), or 1275 and 1445 Hz (the *low tones*). These tone pairs provide a conventional frequency shift of 170 Hz. Some multimode controllers, however, use a 200-Hz tone shift (the same as used on packet radio) on RTTY as well as AMTOR. The 30-Hz difference seems to be of little consequence in practical operation.

If your rig offers FSK, use it. FSK eliminates the need to set an audio level to the transmitter mike jack, and in some transceivers, the FSK position allows you to use the CW IF filter (of course, your



transceiver has to be equipped with such a filter). By using the narrower CW IF filter, you can eliminate a lot of QRM.

The AMTOR Code

AMTOR (and SITOR) use a special method of encoding alphanumeric characters, different from either Baudot or ASCII codes. AMTOR uses a 7-bit code that is capable of representing the 26 uppercase letters of the alphabet, the digits 0-9, punctuation marks and several special characters and control codes—a total of 38 different combinations.

In Table 1, the Baudot, ASCII and AMTOR codes are shown. Note that the AMTOR code uses 7 bits to represent what requires only 5 bits in the Baudot code. Why the additional two bits? These two bits are used to create a code for each character such that there is a constant ratio of three marks to four spaces for every possible character. Thus, the AMTOR code is called a *constant ratio* code. The two bits are used for parity checking and increase error-detection capability. If an error

occurs, there will no longer be the correct 3-to-4 ratio of marks to spaces. The communications processor at the receiving end checks for the correct ratio, so error-detection to a high degree of accuracy is achieved. Of course, it is *possible* for several bits to be corrupted in such a way as to result in another valid character, but that is much less likely to happen when using the AMTOR code. The price paid for this feature is, of course, the two additional bits of overhead per character compared to using Baudot code. With the data rates useful for MF/HF communication, and the availability of inexpensive microprocessor-based error detection, these penalties are small indeed.

AMTOR Modes

Within the general description of AMTOR, there are four basic modes of operation: *Selective Forward Error Correction* (SEL FEC); *Automatic Retransmission upon reQuest* (ARQ); ARQ monitor (listen-only) and *Forwarded Error Correction* (FEC).⁸ Of these, ARQ and FEC are

¹Notes appear on p 28.

Table 1

Baudot (Murray, ITA2), ASCII and AMTOR (CCIR Rec. 476) Codes

Baudot† Bit No.	ASCII†† Bit No.	AMTOR†† Bit No.	LTRS	FIGS
43210	6543210	6543210		
00011	1000001	1000111	A	-
11001	1000010	1110010	B	?
01110	1000011	0011101	C	:
01001	1000100	1010011	D	
00001	1000101	1010110	E	3
01101	1000110	0011011	F	
11010	1000111	0110101	G	
10100	1001000	1101001	H	
00110	1001001	1001101	I	8
01011	1001010	0010111	J	BELL
01111	1001011	0011110	K	(
10010	1001100	1100101	L)
11100	1001101	0111001	M	.
01100	1001110	1011001	N	,
11000	1111001	1110001	O	9
10110	1010000	0101101	P	0
10111	1010001	0101110	Q	1
01010	1010010	1010101	R	4
00101	1010011	1001011	S	,
10000	1010100	1110100	T	5
00111	1010101	1001110	U	7
11110	1010110	0111100	V	=
10011	1010111	0100111	W	2
11101	1011000	0111010	X	/
10101	1011001	0101011	Y	6
10001	1011010	1100011	Z	+
01000	0001101	1111000	Carriage return.	
00010	0001010	1101100	Line feed	
11111	-	1011010	Letter shift	
11011	-	0110110	Figure shift	
00100	0100000	1011100	Space	
00000	0000000	1101010	Blank	
-	-	1100110	Signal repetition (RQ)	
-	-	0110011	Idle signal β	
-	-	0001111	Idle signal α	
-	-	1100101	Control 1	
-	-	1101010	Control 2	
-	-	1001101	Control 3	

†Bits are numbered 0 (least significant) through 4 (most significant).

††Bits are numbered 0 (least significant) through 6 (most significant).

Note: The bit data in the ASCII column is incomplete and does not correlate to the characters shown in the FIGS column. A detailed explanation of these codes (and others) is given in the Digital Communications Chapter of *The 1989 ARRL Handbook*, pp 19-10 to 19-21.

used most often by radio amateurs.

SELFEC

This mode, also known as selective mode B, is quite similar to FEC. The difference between the two is that SELFEC contains an address that allows non-addressee stations to reject it.

ARQ

The fully linked mode in which most AMTOR QSOs take place is ARQ. The transmitters and receivers of the stations at both ends of the QSO are linked or synchronized, alternatively sending and acknowledging three-character blocks of text sent by the transmitting station. There can be only two stations transmitting and receiving on a circuit; no roundtable QSOs are possible in ARQ.

The direction of information flow can be

reversed by either station at any time. If a temporary loss of signal occurs and signal flow is disrupted for any reason, the link will automatically reestablish itself and retransmit the unacknowledged data. (No operator intervention is required.) Under these conditions, the operators at either end of the link see only a reduction in data-flow rate from the sending station to the receiving station. The front-panel LED displays on most communications processors can reveal the link direction and provide you with other signal information. (Experienced operators can tell a lot about the signal just by listening to it.)

ARQ Monitor (Mode L)

This mode allows any number of stations to listen in on a pair of ARQ-linked stations in QSO. And, if both signals are readable, listening stations can copy both sides

of the conversation.

FEC

Sometimes called Mode B or Bc, FEC is a nonlinked mode used mostly for calling CQ, round tables, nets, or when ARQ mode is impossible for some reason. The transmitter is keyed continuously, and text is sent (using FSK or AFSK), in much the same manner as conventional ASCII or Baudot RTTY.

When transmitting in the FEC mode, each character is sent twice, separated by four additional characters. This provides a second chance for the receiving station to correctly decode the same character—a form of time-diversity reception. For short words, idle character codes are used, as required, to fill in spaces at the beginning and end of each group of letters (word). For example, *QTH* would actually be sent as:

Q<idle>T<idle>HQ<idle>T<idle>H

Thus, there are four characters between every once-repeated character. Consequently, using AMTOR's FEC mode (although not absolutely error-free), results in a much lower error rate—for the same path conditions—than Baudot or ASCII. That's because of the duplicate transmission of each character. My on-the-air experience using FEC under poor communications conditions confirms this.

A more-detailed technical explanation of all of these AMTOR modes is contained in the material already cited, and elsewhere.^{9,10,11}

Some Operating Hints

AMTOR's usefulness and enjoyability for ragchewing can be maximized by using operating practices that make QSOs more fun and efficient. Here are some suggestions.

- When just starting out on AMTOR, avoid signal inversion. By convention, AMTOR operation uses *lower sideband* on MF and all HF amateur bands. (This results in the mark signal being the higher emitted frequency). Otherwise, your transmitted signals will be inverted and other stations will not be able to decode your FEC or ARQ transmission unless they realize what's happening and switch sidebands. If you are using FSK, check with another AMTOR or RTTY station to verify correct FSK sense. Many communications processors offer jumper-selectable FSK sense.

- Always *listen* before transmitting on any frequency. You may be able to hear only one of the two stations in an ARQ QSO, so careful listening is needed to verify that a frequency is clear.

- Keep CQs short, and *always* allow some idle signal (for phasing at the receiving end). A 20-second idle, followed by two or three single lines of three CQs, followed by your call sign and SELCAL should be

sufficient. An idle signal alone is a great attention-getter for anyone looking for an AMTOR QSO, so the actual CQ and identification of call sign and SELCAL can be brief.

- A SELCAL is never a replacement for a call sign. The SELCAL is used only by the AMTOR communications processor in Master mode to initiate an ARQ link. Hence, the SELCAL is never used to call a station in FEC, for example.

- Avoid overdriving the audio stages in your transceiver if you're using AFSK. I've heard many AMTOR signals that have multiple tone pairs, the result of overdriving the transmitter's audio stages. Run the audio level up to the point at which ALC action just begins, then reduce the audio level until there is no ALC indication. Of course, speech processors and VOX should be turned off.

- Use fast AGC (manual gain control with weak signals). Slow AGC may add an unacceptable delay to the transmit-to-receive recovery time.

- Remember, in ARQ, there is no need to repeat your name, QTH, etc. (For some, this may be a hard-to-break RTTY habit!) Once is enough! There's no need to ask "How copy?" or "Do you copy?" or "How print?". (Poor conditions may slow down the link data flow, and errors do appear if you try to communicate through a terrible path.)

- Avoid using large message buffers that contain descriptions of everything in the shack from power supplies to antenna tuners. It's better to discuss equipment as appropriate in the QSO. Also, avoid the excessive use of line feeds; they'll make text scroll off the screen at the receiving end. Some stations (like mine) have no way of recovering text that has scrolled off the screen, so the received information is lost.

- Always monitor the received signal aurally. This helps you to determine band conditions and decide whether or not you need to use a narrower filter and passband tuning to eliminate QRM before the link gets too far behind. Often (using IF shift carefully), I have been able to completely null out the received mark or space tones while still maintaining good link flow. Most good AMTOR communications processors provide automatic threshold correction that enables single-tone (mark or space) reception, if necessary. I've observed that even some veteran AMTOR operators are not aware of the threshold-correction capability of their communications processors, and it's not mentioned in some communications-processor equipment manuals.

- There is little need to use high power on ARQ, but if you want to run that amplifier, you'll need to verify that no hot RF switching is taking place.¹² However, I have rarely found any real need to use an external RF power amplifier, even with weak signals and fluttery QSB.

Low power does it! Forty watts to a tribander will get you plenty of DX on ARQ, especially with current good conditions on 10 and 15 meters. This is certainly one of the big pluses of AMTOR operation.

- A computer is *not required* for AMTOR operation (or for packet radio or RTTY for that matter). Any dumb terminal with an RS-232-C interface will work fine and can reduce the software learning-curve time for the newcomer. Many newcomers to AMTOR that I've met on the air have their biggest problems trying to understand the cryptic command syntax of some terminal-emulation software. I have tried AMTOR operation both ways—with a computer and with a dumb terminal. After three years of AMTOR operation, the simple dumb-terminal arrangement seems hard to beat for straightforward AMTOR rag-chewing.

- Help newcomers. Most of us were lost for a while when we first got on the air with AMTOR. Every week I run into someone who is experiencing problems because their transmitted RF is crashing their computer; they're unaware they're sending inverted tones, or any number of other reasons. Once we get a link going, it's a great reward to see their amazement and enthusiasm at how well the system works, and the ease with which a QSO can proceed even under poor conditions.

- Don't touch that dial! Once the link is established, use *only* RIT to correct for any drift by either station. This eliminates the need for stations in QSO to chase each other up and down the band.

- Use the operator's agreement when operating AMTOR. On 80 meters, look for AMTOR signals from 3.550 to 3.650 MHz; on 40, 20, 15, 10, check frequencies from 70 to 80 kHz above the bottom of each band. Also, look for Novices operating between 28.115 to 28.150 MHz.

Summary

I hope the information I've provided here offers you some additional insight on how to use AMTOR. If you haven't tried AMTOR yet, you're missing out on a really enjoyable ham radio communications mode. Don't wait any longer—see you on AMTOR!

Notes

1. J. Martinez, "AMTOR, an improved radioteletype system using a microprocessor," *Radio Communications*, Aug 1979, pp 714-718.
2. J. Martinez, "AMTOR, the easy way," *Radio Communication*, Jun/Jul 1980, pp 610-615.
3. J. Martinez, "AMTOR, an Improved Error-Free RTTY System," *QST*, Jun 1981, pp 25-27.
4. P. Newland, "An Introduction to AMTOR," *QST*, Jul 1983, pp 11-13.
5. W. Meyen, "Operating With AMTOR," Technical Correspondence, *QST*, Jul 1983, pp 40-41.
6. P. Newland, "Report on the Unattended Use of the Teleprinter Code," *QEX*, Mar 1985, pp 8-9.
7. International Telecommunication Union (ITU) Report CCIR 476-3 (1978), "Direct-Printing Tel-

egraph Equipment in the Maritime Mobile Service," is available as a reprint from ARRL HQ as part of the proceedings of The Third Computer Networking Conference. See also, *ARRL Amateur Radio Computer Networking Conferences 1-4*, (Newington: ARRL, 1985), pp 3.125-3.124.

⁸P. Newland, "Algorithms and Methods for SITOR/AMTOR Systems," *QEX*, Jul 1988, pp 9-12.

⁹P. Newland, "A User's Guide to AMTOR Operation," *QST*, Oct 1985, pp 31-34.

¹⁰P. Anderson, "Introduction to and the Operation of AMTOR," available from Kantronics, Inc, 1202 E 23rd St, Lawrence, KS 66046, tel 913-842-7745.

¹¹B. Hale, ed, *The 1989 ARRL Handbook* (Newington: ARRL), p 19-13 to 19-14.

¹²Hot switching occurs when a signal is applied to switching contacts before the switch is transferred. Hot switching damages contact points and may cause the contact points to fuse. Ideally, switch transfer should occur *first*; then the signal is applied to the switch. This is known as *cold* switching. With transceiver and RF power amplifier TR switching, the TR relays should close *before* RF is applied to the relay contacts and open *after* RF is removed from the relay contacts.

Don Huff was first licensed as KN6KDE in 1955, just after his 15th birthday. His involvement in Amateur Radio led him to study electronic engineering at California Polytechnic State College where he minored in Communication Theory. Don has BSEE and MSEE degrees and has been employed by Hewlett-Packard for the past 23 years. He works as a development engineer and Engineering Project Manager in research and development.

Don's main interests in ham radio are CW (fixed and mobile), ragchewing, antenna design and construction and operating AMTOR. Don also holds a Second Class Radiotelegraph Operator's license.

QST

Strays

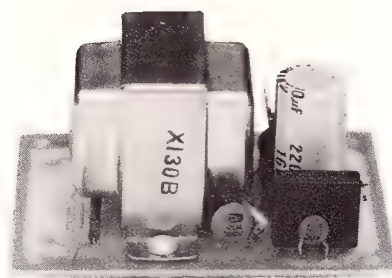


The four 65-foot red cedar poles that supported the famous W1AW Rhombic were taken down in August. The poles came from the West Coast and were transported through the Panama Canal. Installation took place in 1937 by a volunteer crew from the Hartford Electric Light Co. The poles had been the victims of noticeable dry rot. Here, a tree service employee cuts one of the antenna supports into sections before it's transported off the HQ site.

Some Power-Supply Design Hints

RF suppression in regulated supplies can be significant. This article shows how it is done.

By Doug DeMaw, W1FB
ARRL Contributing Editor
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Luther, MI 49656



The textbooks do not cover some of the day-to-day questions that amateurs have about regulated dc power-supply design. For example, how can we keep unwanted RF energy out of a power supply? Also, how might we use a negative voltage regulator to obtain positive output from a power supply?

These are common questions, and the answers are straightforward. Application notes and technical books that deal with power supplies seldom provide answers to

questions of this kind because the writers assume the reader is an engineer. Let's explore the practical aspects of these questions.

Getting Rid of Stray RF Energy

The more complex the regulated power supply, the greater the opportunity for circuit malfunction when RF currents get into the system. To help keep RF out of the supply, it becomes necessary to filter the ac input line to the power supply by means of a brute-force filter. The output port of the power supply needs to be

filtered also, because RF energy can enter the circuit via that route. Some internal RFI suppression measures, such as installing bypass capacitors and ferrite beads at key spots in the power supply, are required in stubborn cases.

What about the less complex regulated supply? Normally we will not experience malfunctions if a moderate amount of RF energy enters the circuit, provided it does not overwhelm the regulator. The usual 0.1- μ F bypass capacitors at the input and output of the regulator IC offer ample protection against RF currents. But another

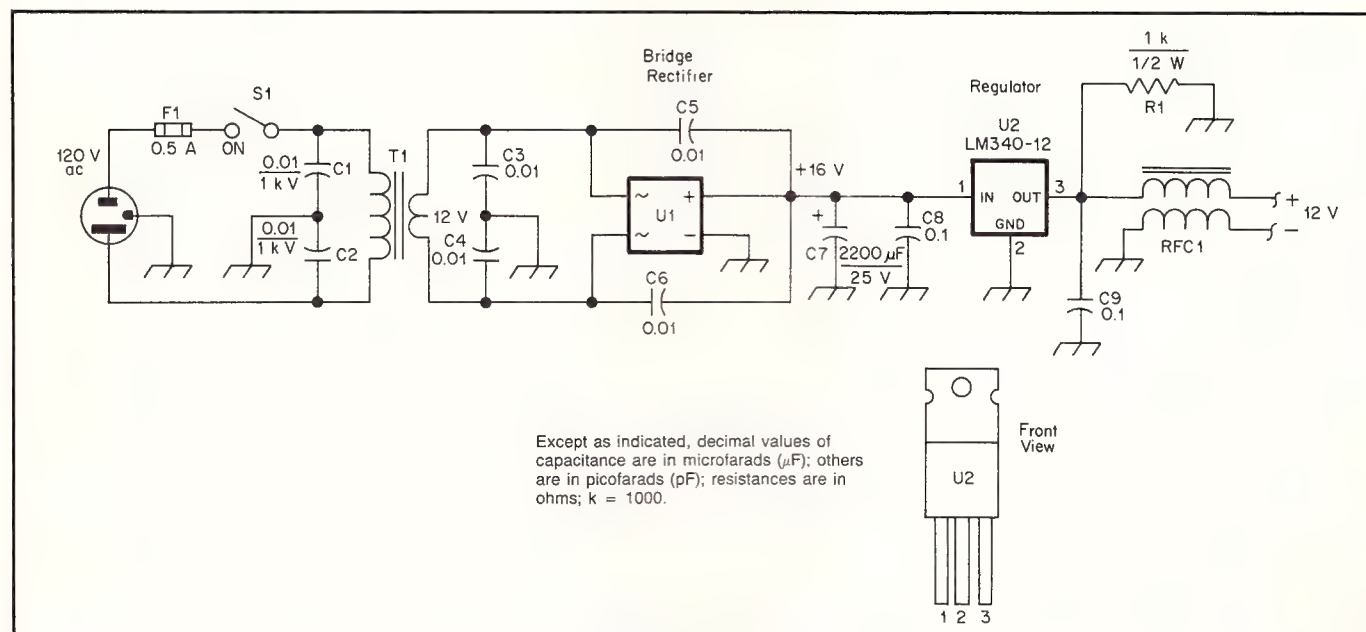


Fig 1—Schematic diagram of the 12-V, 300-mA regulated power supply.

C1-C6, C8, C9—Disc ceramic.
C7—Electrolytic, 2200 μ F, 25 V.
F1—0.5-A fuse.
R1—1-k Ω , 1/2-W carbon composition.

RFC1—Dual RF choke. Use 6 1/2 bifilar turns of no. 26 enam wire on an Amidon BLN-43-202 binocular core.
S1—SPST toggle.

T1—12-V, 500-mA or greater transformer.
U1—In-line bridge rectifier, 2-A, 50-PRV or greater.
U2—12-V, 1-A three-terminal regulator IC.

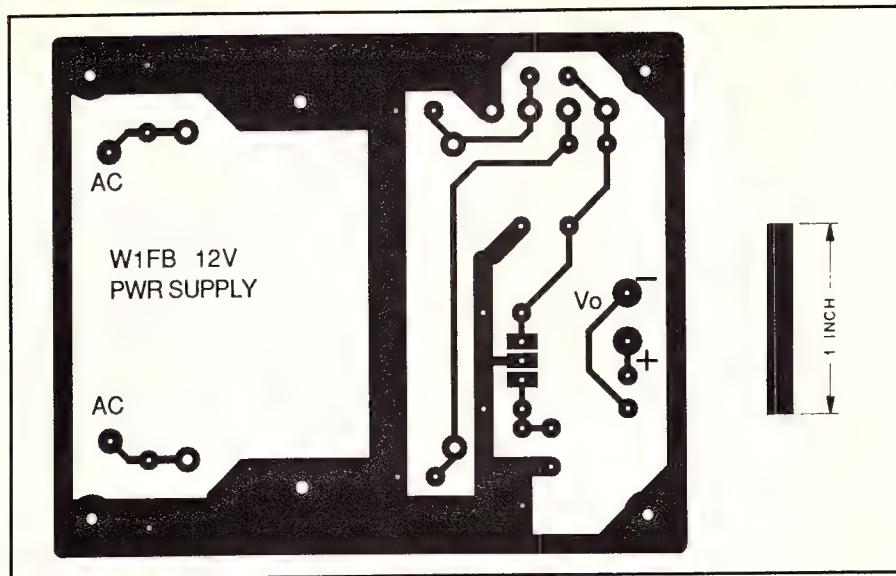


Fig 2—Circuit-board etching pattern for the 12-V power supply, shown full size from the etched side of the board.

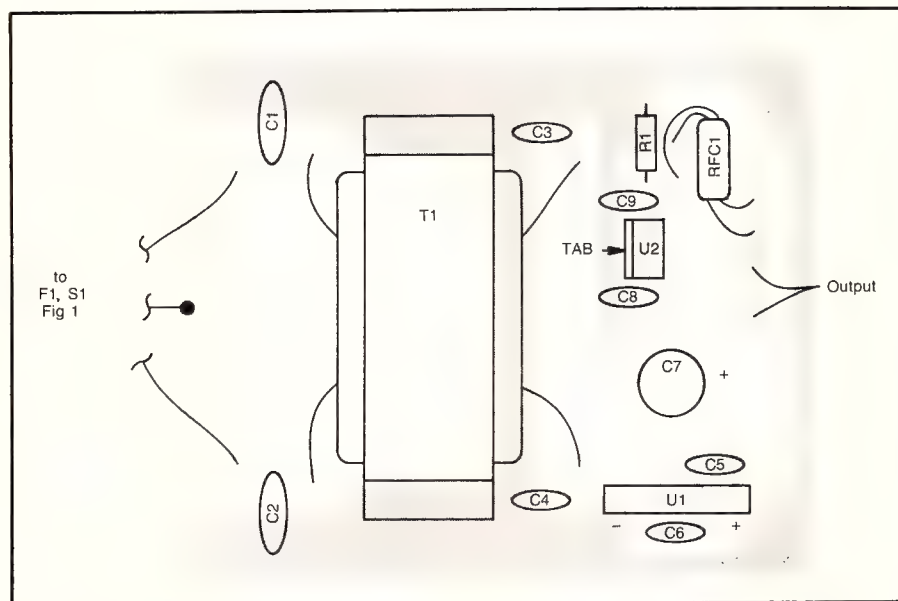


Fig 3—Parts-placement guide for the 12-V power-supply PC board. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. Component outlines are not necessarily representative of the shapes of the actual parts used.

situation can occur, whereby RF energy gets into the power supply and affects the equipment powered by the supply.

A notable example is a direct-conversion (D-C) receiver that is seriously afflicted with hum in the upper part of the HF spectrum. The malady is known as *common-mode hum*. You have probably experienced common-mode hum if you have used an HW-7, HW-8 or a homemade D-C receiver with an ac-operated dc power supply. RF energy from the receiver local oscillator enters the power supply and passes into the rectifier circuit. The RF

energy becomes hum-modulated (120 Hz) in the diodes and is reradiated into the receiver front end (via the antenna) at the operating frequency.

Some simple RF-proofing measures can be applied to any 12-V power supply. Fig 1 shows the circuit of a low-current 12-V regulated supply I built for use with QRP gear and some of my lab test equipment. C1 and C2 are used as RF bypass capacitors at the ac input to T1. Each diode in bridge rectifier U1 is bypassed with a 0.01- μ F capacitor (C3, C4, C5 and C6). These capacitors can also be placed in

parallel with separate rectifier diodes if you use them. The capacitors bypass the RF energy around the diodes and help prevent hum modulation of any RF current that may be present in that part of the circuit.

Attention must be paid to the power-supply output lines as well. RFC1 of Fig 1 blocks the passage of RF and keeps it out of the power-supply circuit. I use a bifilar choke wound on a small ferrite binocular core. C9 aids the RF filtering by serving as a bypass capacitor. J1 and J2 are bypassed by means of a 0.1- μ F capacitor at each jack. This increases the effectiveness of RFC1. Wes Hayward, W7ZOI, tipped me off to the implementation of RFC1 many years ago. The bifilar-wound choke will work equally well on a ferrite toroid core (850 μ_e suitable). I have not experienced common-mode hum while using this circuit with a number of D-C receivers, even while listening to the 10-meter band.

I have not observed any voltage variations while using the power supply in Fig 1, even when strong RF fields were present at my work bench. A final step can be taken to ensure RF immunity of the power supply: Connect an earth ground to the negative bus of the circuit, or to the cabinet if the negative bus is common to it.

Building the Supply

I used a PC board to contain the components for the circuit in Fig 1. The maximum current that can be drawn from this supply is 300 mA. You can use a larger transformer by mounting it outboard from the PC board. Do not exceed the current capability of the regulator, U2, which is rated for a maximum output current of 1A. A heftier regulator along with a suitable heat sink can be used in place of the LM340. Better still, use the LM340-12 with a current-pass transistor. A circuit example is shown in Fig 4.

The rectifier diodes must have ample current ratings for any increase you plan for this circuit. Similarly, RFC1 needs to be wound with wire large enough to pass the output current without causing a voltage drop. Increased wire diameter requires a larger core for RFC1.

The PC board for my power supply measures 2-3/4 \times 3-1/8 inches. Drilled and plated boards are available by mail.¹ You can use point-to-point wiring if you do not want to build your circuit on a PC board. Layout is not critical. A scale etching template is provided in Fig 2, and a parts-placement guide is shown in Fig 3.

You will observe that a 12-V power transformer is used with the circuit in Fig 1. Don't despair, because the output voltage from the bridge rectifier is 1.41 times the ac input voltage, minus the voltage drop across the forward diodes

¹Notes appear on page 40.

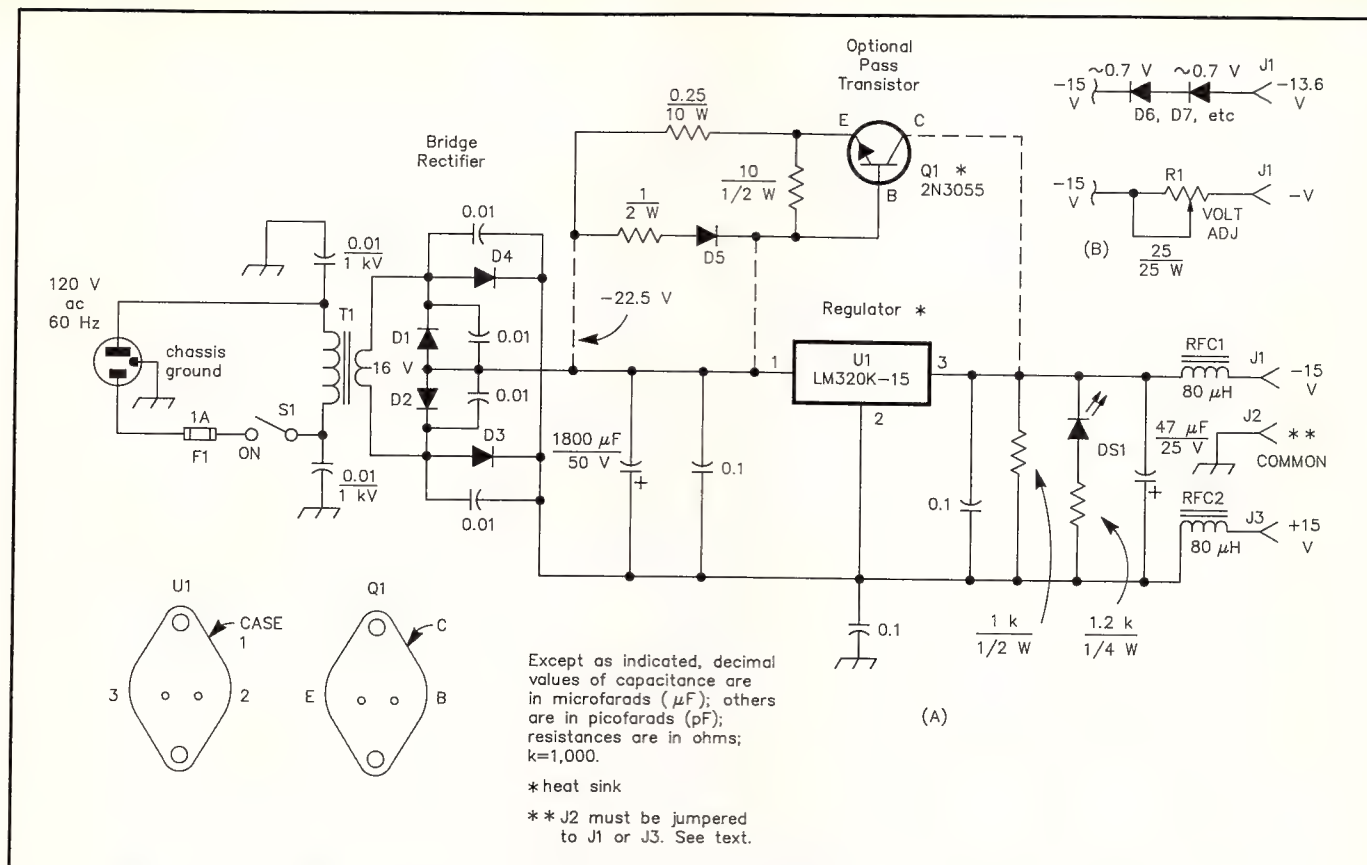


Fig 4—Schematic diagram of the 15-V regulated power supply. Capacitors are disc ceramic except those with polarity marked, which are electrolytic. Resistors are carbon composition.

D1-D4, incl—6-A, 100-PRV rectifier diode.
D5—1-A, 50-PRV rectifier diode.
D6, D7—See text.
DS1—Red LED.
F1—1-A fuse.
J1, J2, J3—Binding post. One black, one white and one red.

Q1—See text.
R1—See text.
RFC1, RFC2—RF choke. Use 25 turns of no. 20 enam wire on an Amidon Assoc B-72-1011 ferrite bobbin. An FT-50-43 toroid core can be used in place of the bobbin.

S1—SPST toggle.
T1—16-V, 2.5-A or greater transformer.
U1—Negative 15-V, 1-A regulator IC, LM320K.

(0.7 V). This results in approximately 16 V dc at the input to regulator U2. This is an acceptable approach for low-current supplies. I do not recommend it for supplies that deliver 1 A or greater. It is better, in that event, to use a 16- or 18-V transformer for T1.

Using Negative Regulators

We frequently see bargain-priced negative regulators as surplus, but have no need for a negative supply. I recently came into possession of a small box filled with unused -15-V, 1-A regulator ICs—for free! I decided to build a power supply around one of them, and the circuit is presented in Fig 4. It can be used as a positive or negative 15-V regulated supply. Note: You cannot use this supply to simultaneously deliver ± 15 V to a load.

T1 is a 2.5-A, 16-V transformer I bought from a surplus dealer. Therefore, I can add a current-pass transistor (Q1) to increase the power supply output-current rating over that available from the U1 regulator. The dashed lines show the required cir-

cuitry for employing the pass transistor.

The Fig 4 circuit illustrates how the negative and positive lines of the supply can be floated above the chassis ground in order to extract positive or negative output from the circuit. J2 is common to the power-supply chassis. When a positive output voltage is required, you can ground the negative terminal (J1) by joining it to J2. Then take the output voltage from J3 and J2. Bridge J3 and J2 if you desire a negative output voltage and take the output voltage from J1 and J2.

Inset B of Fig 4 shows methods for lowering the power-supply output voltage, if desired. Each diode you place in series between RFC1 and J1 will lower the output voltage by approximately 0.7 V. (Be sure to measure the output voltage accurately before applying it to a given circuit.) D6 and D7 (plus any additional diodes) must be capable of passing the current taken by the load. I suggest that you use a diode-amperage rating of at least three times the load current. The series diodes can be mounted on a heat sink for

additional protection against overheating.

Fig 4B also shows a series resistance (R1) in the output voltage lead. This method is somewhat crude, and it is useful only when the load draws a constant current. Variations in current will cause fluctuation of the output voltage amplitude. A high-wattage rheostat can be used for R1. It should have no more maximum resistance than is needed to provide the desired voltage drop.

The 15-V power supply employs RF energy suppression in the same manner as the circuit in Fig 1. An internal view of the 15-V power supply is provided in Fig 5.

Closing Comments

The Fig 5 power supply is housed in a new surplus case I obtained from N8HLE/1. The case is 8-1/4 inches deep, 3-1/4 inches wide and 2-7/8 inches high, is made from 1/8-inch-thick black anodized aluminum and has a natural-finish, perforated-aluminum cover. The front panel is slotted for a bar-graph indicator

(continued on page 40)

Henry Radio Tempo 3002A 2-Meter Linear Amplifier

Reviewed by Mark J. Wilson, AA2Z

There are times during 2-meter operation when legal-limit power is a big help. You don't need (nor should you want) to use high power to work through the local FM repeater or AMSAT-OSCAR 13. But if you hang around the bottom 300 kilohertz of the band, and if DX is your game, having 1500 watts of solid RF on tap can help you work those elusive tropo, aurora, scatter and moonbounce contacts.

For years, Henry Radio has offered VHF enthusiasts an alternative to bending their own sheet metal. Many a VHF DX contact has been made using power by Henry, and the 3002A carries on this tradition.

The 3002A uses a single EIMAC 8877 triode. Featuring a self-contained power supply, metering and control circuitry and an antenna relay, the 3002A is about as challenging to use as a typical HF amplifier. So much for the myths about the difficulty of serious 2-meter operation.

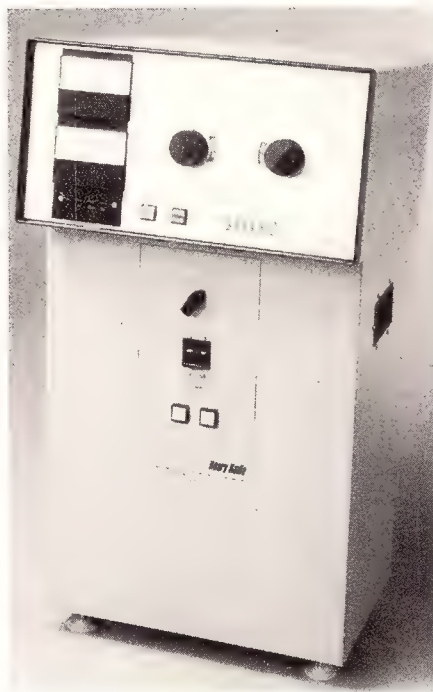
Construction

The 3002A looks similar to the floor-model Henry HF amplifiers. Standing almost three feet tall and tipping the scales at close to 200 pounds, the 3002A makes an impressive package. The power supply and control circuitry are housed in the base, and the RF deck is mounted on top.

The 8877 and associated RF circuitry are built in a solid aluminum case that fits inside the main enclosure. The output circuit uses a pair of striplines with the tube in the center, reminiscent of the classic W6PO 2-meter amplifier design that many hams have duplicated. Tuning and loading are handled by a pair of capacitors, with a thick sheet of Teflon® dielectric material between the two plates of each capacitor.

The blower, which pressurizes the RF deck, is mounted inside the power supply. After cooling air passes over the tube's base, a chimney forces the air to travel through the tube's anode-cooling fins. Hot air exits through a screened hole in the cabinet top. Blower noise is moderate.

In these days of microprocessor control and fancy displays, the 3002A's front panel is relatively Spartan. Two meters dominate the left side of the RF deck: One reads anode current (0-1 A), the other is switchable between grid current (0-100 mA) and high voltage (0-10 kV). There is, of course, no band switch. The two large knobs with counter dials are for **INPUT TUNE** and **OUTPUT TUNE**. The **PA LOAD** control is located on the rear panel, which is not a problem



because it's a set-and-forget adjustment. (You need only use this control when you switch antennas.) Push-button switches below the meters are for switching between standby and operate, and for switching the multimeter between grid current and high voltage. A pair of indicator lamps show **POWER** and **STAND BY**. The **STAND BY** light glows when the 3002A's two-minute warm-up period is over (the 8877 must be warmed up before use). The **POWER** lamp glows

when ac power is applied, the warm-up period is over and the amplifier is switched to operate.

On the front of the base is the **POWER ON/OFF** circuit breaker that serves as the main power switch. The **SSB/CW** switch does not affect class of operation; it simply switches between two taps on the high-voltage transformer. **CW** (suggested for tune-up, CW, FM, RTTY and AM operation) provides about 2500 V with no load. **SSB** raises the high voltage to about 3500.

In addition to the **PA LOAD** control, the rear of the RF deck has a BNC connector for **RF INPUT**, an N connector for **RF OUTPUT** and a phono jack for **RELAY CONTROL**. A large air filter occupies much of the rear of the base. A 1.5-A fuse that protects the cathode circuit is also accessible from the rear panel.

Hookup and Operation

Because of its weight, the 3002A must be shipped by truck. The review unit was packed in a sturdy cardboard carton, mounted on a wooden platform, and it survived the cross-country journey with just one small dent in its RF-deck cabinet.

Henry ships the amplifier with tube and power transformer installed, and ready for operation. You must supply your own ac power plug. I had no trouble installing a standard 20-A, 240-V plug to match the outlet in my shack. Primary taps on the transformer allow 200, 220 or 240-V operation. From the factory, the 3002A is ready for 220-V use. Operation from 120 V is not possible (and is not desirable for any amplifier in this power class).

Included accessories are the operator's

Table 1

Henry 3002A 2-Meter Amplifier, Serial no. 60-162

Manufacturer's Claimed Specifications

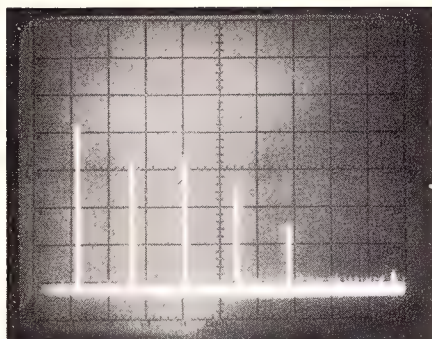
Frequency coverage: Available for 100 to 200 MHz; 144 to 148 MHz standard. Tunable over $\pm 5\%$ of center frequency.
Driving power required: 40 to 60 W typical.
Maximum power output: 1500 W continuous.
Spurious emissions: Reduced in accordance with requirements for application by means of external output filter
Keying: Ground to transmit.
Primary power requirements: Primary taps for 200, 220 and 240 V ac, 30 A maximum.
Color: Light gray.
Size (HWD): 32.75 x 15 x 16.5 inches.
Weight: 190 lb (shipping weight).

Measured in ARRL Lab

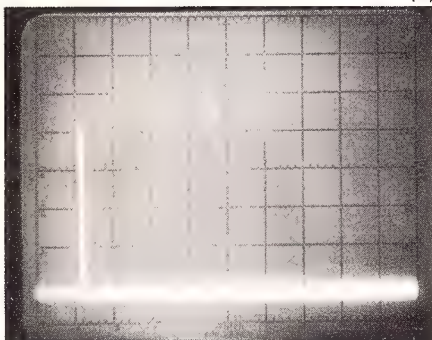
144 to 148 MHz.

50 W for 1500 W output.
As specified.

Complies with current FCC specifications. See Fig 1.



(A)



(B)

Fig 1—Worst-case spectral display of the Henry 3002A. Horizontal divisions are each 100 MHz; vertical divisions are each 10 dB. Output power is approximately 800 W at 144.2 MHz. The fundamental has been reduced by approximately 28 dB by means of notch cavities to prevent spectrum-analyzer overload. Photo A shows the 3002A operating without its external output filter; photo B shows the output with the filter in place. With the filter installed, all harmonics and spurious emissions are at least 60 dB below peak fundamental output. With the output filter, the Henry 3002A complies with current FCC specifications for spectral purity.

manual, RF-input cable, relay-control cable, spline wrench (for the dials), a box of 1.5-A fuses and an output filter. That's right, an output filter. Henry can supply the 3002A for any frequency between 100 and 200 MHz for many uses other than ham DXing, and they supply an appropriate filter for the intended use. Note that you must connect the filter between the 3002A's **RF OUTPUT** connector and your antenna to suppress the 3002A's harmonics to a legal level. See Fig 1.

Hooking up the 3002A was a breeze. (The hard part was wrestling it into my shack...) As suggested in the instruction manual, I first drove the amplifier with 10 watts from my transverter. This allowed me to familiarize myself with tuning and loading the amp at reduced power—and at reduced risk of damaging the 3002A. Initial tune-up yielded almost 400 watts output—Henry rates amplifier gain at 15 dB!

Operation was smooth and trouble free,

so I added an RF Concepts solid-state amplifier in line between the transverter and amplifier input. This time, I had no trouble slamming my Bird wattmeter needle against the peg (the 1-kW element was installed). Off to the telephone to borrow a higher-power Bird element! The 3002A easily tunes up to 1500 W output with about 50 W drive, and operation at that power level is well within the safe anode- and grid-current ratings for the 8877.

It's hard to describe the difference that legal-limit power makes during 2-meter weak-signal operation. I normally run about 400 W output, and the difference on aurora, meteor scatter and marginal tropo contacts is tremendous. The extra 6 dB or so in signal strength made the difference in being just another signal on the band and being able to attract a lot of callers during the many auroral events we've had recently.

The 3002A's biggest test came during the September VHF QSO Party at W1XX/3. Although the 3002A does not exactly lend itself to mountaintop-portable operation,

we dragged it along anyway because we thought that it would be worth the trouble. The amplifier ran flawlessly for the entire contest period, and the end result was 672 2-meter contacts in 87 grid squares—with flat band conditions! In 1988, operating from the same site with similar antennas and 500 W, we worked 88 grids with the help of two aurora sessions and a little tropo enhancement. Our 2-meter op, Clarke Greene, K1JX, attributes the difference to running high power and being able to attract very weak stations at the edge of the normal tropo range.

I really enjoyed using the 3002A. It's a solid performer, and it does what all good amplifiers should: Make lots of watts with a minimum of hassle.

Price class: 3002A (including power supply, 8877, vacuum antenna-changeover relay), \$2395; RF deck only (including 8877, but less power supply and relay), \$1595. Manufacturer: Henry Radio, 2050 S Bundy Dr, Los Angeles, CA 90025, tel 213-820-1234.

AUTEK WM1 SWR/WATTMETER

Reviewed by Kirk Kleinschmidt, NT0Z

Before acquiring the Autek WM1 SWR/wattmeter, I found myself in a predicament many hams probably face: I needed an easy way to measure the PEP output of my transceiver and amplifier—without spending a lot of money, and without using more than one metering device. To make matters even more challenging, my "ultimate" power meter has to perform well from 5 to 1500 watts! The Autek WM1 does the job; it saved me the trouble of building two wattmeters: one for QRP, and one for medium- and high-power operation.

Description

The WM1 is an RF-power and SWR-computing meter that operates from 1.5 to 30 MHz with a usable power-measurement

range of 0.5 to 2000 W. The unit measures PEP or average power in three ranges: 0 to 20 W, 0 to 200 W and 0 to 2 kW. SWR is indicated on a separate meter, eliminating the need to switch back and forth between forward- and reflected-power readings.

The WM1's RF-sensing head is attached to the main meter unit via a 4-foot cable, allowing the head to be installed in any convenient location. In my setup, the WM1 sits on a shelf above my operating table, and the sensing head is fastened directly to my amplifier's **RF OUTPUT** connector. This arrangement eliminates a couple of short runs of coaxial cable, and keeps the coax from dragging the meter around (I call this the *tail wagging the dog* syndrome).

Autek regards the schematic diagram for the WM1 as proprietary. Other than a circuit diagram for the sensing head (a typical toroid-and-diode directional-coupler design), the rest of the meter, in-

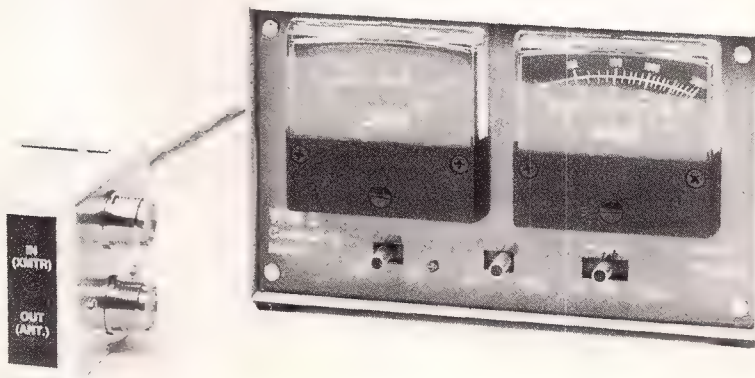


Table 2**Autek WM1 SWR/Wattmeter***Manufacturer's Claimed Specifications*

Accuracy: $\pm 5\%$ of full-scale (FS) reading,
 $\pm 10\%$ of FS reading below 20% of FS.
 Power source: 9 to 18 V dc (battery or
 ac-to-dc adapter [supplied]) at 15 mA.
 Insertion VSWR: Less than 1.1:1.
 Low-power threshold for SWR-computation
 circuit: 0.5 W.
 Color: Gray.
 Weight: Approx 1 lb.
 Size (HWD): $3\frac{1}{2} \times 6\frac{1}{2} \times 2\frac{3}{4}$ inches.

Measured in the ARRL Lab

As specified.
 As specified.
 As specified.
 As specified.

cluding peak detectors, voltage regulator and divider network (the computing part) is presented only in block-diagram form.

The sensing head and main unit appear to be well-made. All of the components in the main enclosure are mounted on a small, high-quality circuit board. Access for calibration adjustments is provided through a large slot in the back of the enclosure.

Using the WM1

Setting up the WM1 is not difficult. Simply plug in the ac-to-dc supply (supplied) and connect the sensing head in series with your 50- Ω antenna cable (just before your antenna tuner, if you use one). The WM1 may be powered from a 9- or 12-V battery, in lieu of the supplied ac-to-dc adapter, making the meter suitable for portable operation.

To use the WM1, first select the appropriate power range. For greatest accuracy, use the lowest practical range. Then, choose between average and PEP power measurement. When reading average power, the meter behaves like any other conventional wattmeter. A slight delay in the readings is caused by the meter's inability to quickly follow short RF-power peaks. The WM1's PEP mode eliminates this delay, and allows you to get an accurate picture of your station's RF-power peaks on SSB, CW or any other mode. To facilitate PEP measurement, peak RF values are sensed electronically, captured, and then displayed on the meter. The meter-deflection amplifier has a fast attack time and a slow delay time. This way, the WM1 can measure and display RF-power peaks lasting only a few milliseconds. Regardless of the power-measuring mode, the WM1 calculates SWR automatically, and requires no adjustments or calibration.

Using the WM1 makes me wonder how I managed to get along without it! I especially like the PEP mode. It's quite useful, whether I need an accurate way to keep my PEP output at less than 5 or 10 W (for QRP work), or need to know the PEP output of my kilowatt amplifier. Power readings are consistent among the three ranges.

If you're concerned about the WM1's metering accuracy (manufacturer-rated as typically within 5% of full scale), don't be. Unless you're performing critical tests, knowing whether your transceiver is putting out 100 W or 93 W is of little real value. The beauty of the WM1 is its ability to accurately track over a wide range of power levels, displaying PEP-output and SWR readings without requiring any adjustments.

Beating the WM1's price-versus-performance ratio is difficult. Auttek has packed a lot of performance into the WM1, considering the unit's price tag.

Price: WM1 (including shipping and handling, plug-in ac-to-dc supply, instruction manual and one-year warranty), \$109. Manufacturer: Auttek Research, Box 302, Odessa, FL 33556, tel 813-920-5810. (Auttek sells only factory-direct.)

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

[In order to present the most objective reviews, ARRL purchases equipment off the shelf from Amateur Radio dealers. ARRL receives no remuneration for items presented in the Product Review or New Products columns.—Ed.]

The ARRL-purchased Product Review equipment listed below is for sale to the highest bidder. Prices quoted are minimum acceptable bids, and are discounted from the purchase prices.

Advanced Radio Devices model 230A MF/HF linear amplifier, s/n 0126 (see Product Review, May 1989 *QST*). Minimum bid: \$3500.

Heath® SB-1400 MF/HF transceiver, s/n 8K020058, including SBA-1400-4 heavy-duty power supply/speaker and SBA-1400-2 hand-held microphone (see Product Review, October 1989 *QST*). Sold as a package only. Minimum bid: \$772.

Amp International (formerly Amp Supply) model LK-550 MF/HF linear amplifier (based on three 3-500Z tubes), s/n 2052. Minimum bid: \$865.*

Sealed bids must be submitted by mail

and must be postmarked on or before November 27, 1989. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In the case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

In your bid, please clearly identify the item you wish to bid on, using the manufacturer's name, model number, or other identification number, if specified. Each item requires a separate bid and envelope. Shipping charges will be paid by the successful bidder, FOB Newington. The successful bidder will be advised by mail. No other notifications will be made, and no information will be given by telephone to anyone regarding final price or identity of the successful bidder.

Please send bids to Kathy McGrath, Product Bids, ARRL, 225 Main St, Newington, CT 06111.

*Editor's Note: The Amp International LK-550 amplifier was purchased for Product Review, but Amp International went out of business during the review period. A review of this amplifier has not appeared, and will not appear, in *QST*. The amplifier is in good working order and has had only light use. As far as we know, there is no factory or other warranty support available for this amplifier. Several Amateur Radio dealers and repair facilities provide amplifier servicing, however.

Because of the unusual circumstances under which this amplifier is being sold, an additional discount from the original purchase price is reflected in the minimum bid for this item.

QST

New Products

AEA MACRATT DATA-CONTROLLER SOFTWARE FOR MACINTOSH COMPUTERS

□ Advanced Electronic Applications (AEA) has announced the availability of their Apple® Macintosh® data-controller software, called MacRATT. MacRATT, which has FAX capability, works with (and supports all modes of) AEA's PK-232, PK-88 and PK-87 data controllers.

MacRATT's features include program operation via the computer's mouse; direct FAX-image printing (without changing cables); ten user-definable macros; and compatibility with MultiFinder™ and Macintosh models 512K, 512E, Plus, SE and Mac II.

Price: \$59.95. Available through AEA dealers. Manufacturer: AEA, PO Box C-2160, Lynwood, WA 98036, tel 206-775-7373.—Rus Healy, NJ2L

Hints and Kinks

Conducted By David Newkirk, AK7M
Assistant Technical Editor

PUTTING THE MINI-MISER'S DREAM RECEIVER ON 7 AND 10 MHz

□ Here's how to modify Doug DeMaw's Mini-Miser's Dream (MMD) receiver^{1,2} for 40- or 30-meter coverage with a 4.0-MHz intermediate frequency (IF). The modifications involve four main changes: (1) Reworking the crystal filter to a half lattice³ and moving the MMD's IF amplifier and beat-frequency oscillator (BFO) to 4.0 MHz; (2) reworking the receiver's variable-frequency oscillator (VFO) and its π output filter to cover the 40- or 30-meter bands; (3) adding a 10-MHz input circuit in the 30-meter version; and (4) adding a two-pole, doubly terminated band-pass filter in the MMD mixer's 50-ohm input line. So far, I've modified two MMDs: one for 40 and another for 30 meters.

Crystal-Filter, IF-Amplifier and BFO Modifications

I graded a batch of surplus, 4.0-MHz, HC33/U-holder crystals by frequency with the test oscillator described by Hayward⁴ and selected three crystals for each receiver: two differing by about 210 Hz (suitable for a half-lattice filter), and a third (for the BFO) about 250 Hz lower than the average frequency of the first two crystals. The measured crystal frequencies for one receiver were 3999.283, 3999.071 and 3998.988 MHz, respectively; for the other receiver, 3999.291, 3999.079 and 3998.895 MHz. (Remember, the filter crystals function in the series-resonant mode. In the MMD's BFO—and in Hayward's test oscillator—the crystal functions in the parallel-resonant mode. The actual IF is higher than the measured oscillation frequency—slightly higher than 4.0 MHz.) I installed the second filter crystal in place of C3 (the original circuit's filter phasing capacitor), and rewound the MMD's bifilar crystal-filter inductor, L1, with 8 bifilar turns of no. 28 enameled wire. A 10-k Ω resistor installed across RFC1 provides a defined resistive termination for the filter. The measured 6-dB bandwidth of the half-lattice filter is 400 Hz; this gives good single-signal selectivity.

I also modified T2, the MMD's IF-amplifier output transformer, rewinding its primary with 10 center-tapped turns of no. 26 enameled wire to give greater leeway in adjusting T2's tuning trimmer. (As for 3.3 MHz,

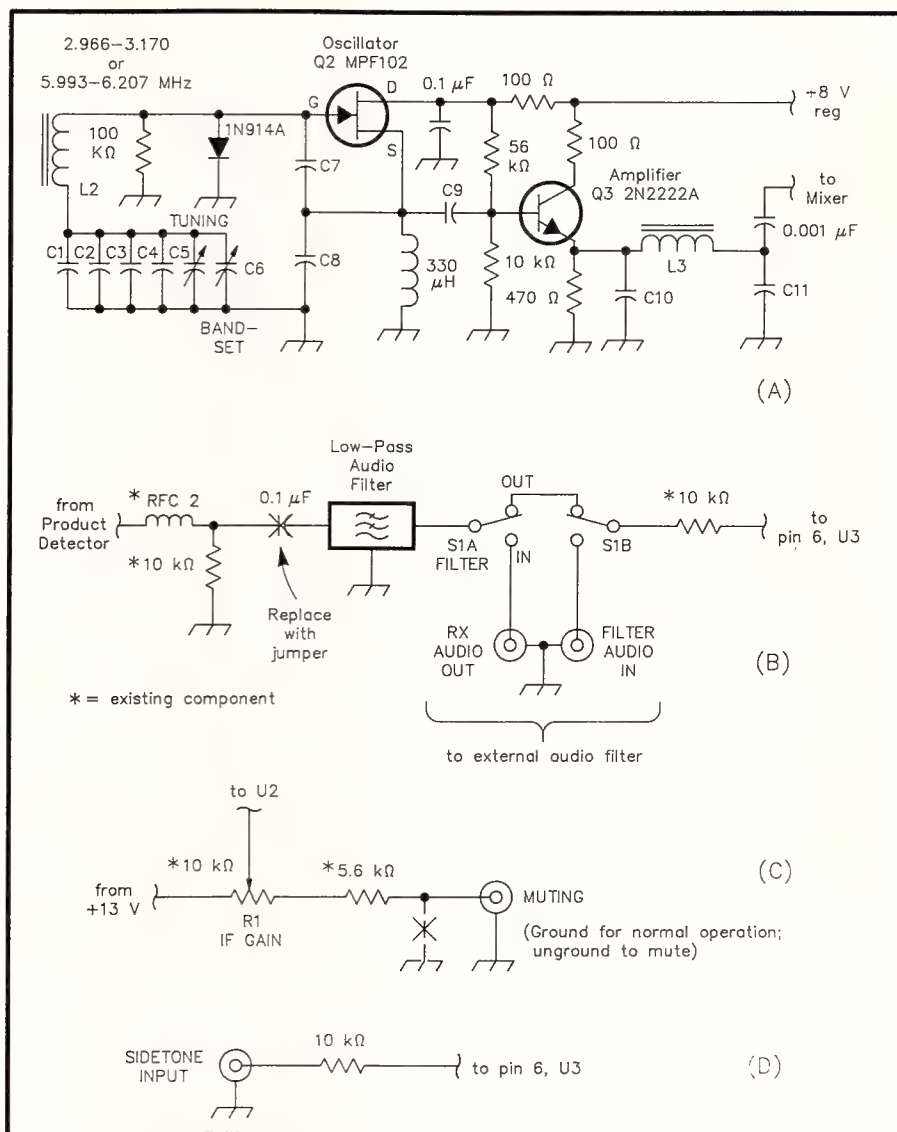


Fig 1—Herb Ley modified the Mini-Miser's Dream VFO for 40- or 30-meter operation as shown at A. The VFO tunes from 2.966 to 3.170 MHz for 40 m and 5.993 to 6.207 MHz for 30 m. B shows Herb's added audio-filter switching, and C and D show muting and sidetone-input modifications not described in the text. All numbered capacitors are NP0 (C0G) ceramic.

C1, C2—100 pF.

C3—Not used at 40 m; 47 pF at 30 m.

C4—Not used at 40 m; 4.7 pF at 30 m.

C5, C6—30 pF.

C7, C8—940 pF (2 \times 470 pF in parallel) at 40 m; 470 pF at 30 m.

C9—47 pF.

C10, C11—100 pF at 40 m; 47 pF at 30 m.

L2—18.1 μ H (62 turns of no. 28 enam wire on a T-68-6 toroidal core) at 40 m; 5.12 μ H (33 turns of no. 24 enam wire on a T-68-6 core) at 30 m. To allow for variation in capacitor values, wind this inductor with 10% more turns than necessary and remove turns, one at a time, until you achieve the desired tuning range.

L3—13.6 μ H (17 turns of no. 26 enam wire on an FT-50-61 toroidal core) at 40 m; 6.8 μ H (12 turns of no. 26 enam wire on an FT-50-61 toroidal core) at 30 m.

T2's secondary consists of 3 turns of no. 26 enameled wire).

Aside from installing a 4.0-MHz BFO crystal, the MMD BFO modification involves replacing the BFO's 100-pF fixed capacitor (in series with Y2, the BFO

crystal) with a 15- to 150-pF, ceramic-dielectric variable capacitor to allow BFO-frequency adjustment.

Reworking the VFO and Its π Output Filter

After studying the articles by Hayward

¹D. DeMaw, "The Mini-Miser's Dream Receiver," QST, Sep 1976, pp 20-23. Also see Feedback, QST, Nov 1976, p 22.

²Circuit boards and kits for this receiver are available from Circuit Board Specialists, PO Box 951, Pueblo, CO 81002, tel 719-542-4525.

³For more on crystal filters, including a description of the half-lattice configuration, see The 1989 ARRL Handbook, pp 12-26 to 12-28.—AK7M

⁴W. Hayward, "A Unified Approach to the Design of Crystal Ladder Filters," QST, May 1982, pp 21-27. Also see Feedback, QST, Jul 1987, p 41.

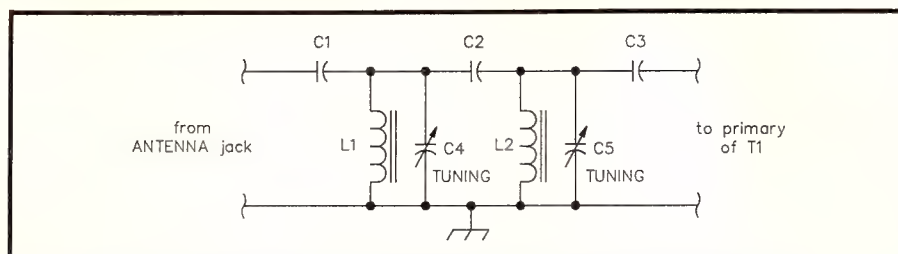


Fig 2—Herb Ley added this doubly tuned filter between the antenna and mixer in his modified Mini-Miser's Dream receivers for improved spurious-signal rejection.

C1, C3—40 pF at 40 m; 24 pF at 30 m.

C2—4.6 pF at 40 m; 2.6 pF at 30 m.

C4, C5—Nominal values: 188 pF at 40 m; 159 pF at 30 m.

L1, L2—2.16 μ H (19 turns of no. 22 enam wire on a T-50-2 toroidal core) at 40 m; 1.34 μ H (18 turns of no. 22 enam wire on a T-50-2 core) at 30 m.

and Lawson,⁵ and Lewallen,⁶ I measured the frequency drift of a prototype oscillator containing various combinations of polystyrene and NP0 ceramic capacitors, and T-68-2 and T-68-6 toroidal inductors. The results confirmed Lewallen's observations of the better stability of NP0 capacitors and T-68-6 inductors. I also followed Lewallen's recommendation (attributed to Hayward) to anneal the toroids in boiling water for a few minutes after winding and coating the coils with Q-dope.

The modified MMD's VFO must tune from 3.0-3.17 MHz to cover 40 meters, or 6.0-6.2 MHz to cover 30 meters. Corresponding changes must be made in the VFO output filter. Fig 1 shows a schematic of the modified MMD VFO. For greater frequency stability than that possible with polystyrene capacitors, I used NP0 ceramic capacitors for all fixed capacitors in the VFO tuned circuit. Each of two MMD VFOs modified in this way drift approximately 80 Hz during the first 15 minutes after turn-on.

Using a toroidal inductor instead of the original slug-tuned MMD VFO inductor, L2, makes room for a 30-pF, air-dielectric variable capacitor (a Hammarlund APC-30 in my MMDs) on the right rear side of the VFO enclosure. This bandset control, the shaft of which projects near C3, allows me to set the VFO range to cover 100-kHz band segments and does away with the need to do tedious cut-and-try experimentation with the inductance of L2. I chose a tuning range of 100 kHz as a compromise between reasonable bandspread, the MMD's selectivity and the suboptimal quality of my receiver's vernier drive.

New Mixer-Input Transformer for the 30-Meter Version

For 30 meters, the secondary winding of T1 consists of 17 center-tapped turns of no. 24 enameled wire on a T-50-6 toroidal,

powdered-iron core. The primary is 3 turns of no. 24 enameled wire over the secondary winding. This modification was described by Collins.⁷

Input Band-Pass Filters

I calculated component values for the antenna-line band-pass filters from the formulas in *Solid-State Design for the Radio Amateur*⁸ using a computer program and K values (from Amidon's data sheets) that differ slightly from those used in *Solid-State Design*. Fig 2 shows the filter circuit. The most difficult component to find for either filter is the coupling capacitor, C12. Radio Shack® currently stocks an assortment of low-capacitance disc-ceramic capacitors (RS no. 272-806); this assortment may contain capacitors close to the values you need. Short pieces of RG-174 coax can also serve as this capacitor, as discussed in *Solid-State Design*. Still another alternative is to use low-capacitance trimmer capacitors adjusted to the necessary value by measurement or estimation. To align these filters quickly, tune in a signal at the center of the MMD's tuning range and adjust C1 and C2 for maximum output. A more refined method involves adjusting C1 for maximum response on a signal 25% from one end of the band, and C2 on a signal 25% from the other end of the band.

Comments and Conclusions

The Mini-Miser's Dream lacks audio filtering. I mounted the input band-pass filter on the receiver's rear wall in the spot formerly occupied by the original receiver's 20-meter converter, and mounted an active, low-pass audio filter⁹ on the right wall of the enclosure. (I chose not to use the 20-meter converter originally presented with the receiver because its MOSFET mixer is susceptible to intermodulation distortion; instead, I use an external converter with a low-gain RF stage, doubly balanced

diode mixer and post-mixer amplifier. If you prefer to use the inboard 20-meter converter, you can mount it on the receiver's rear wall.) Next, I rewired the old 40/20-M switch to select, when needed, an external band-pass active audio filter.¹⁰ These filters, which are switched into the audio output line of the receiver, may overload when the receiver gain is increased enough to drive low-sensitivity, hi-fi headphones; they work very well with 8- Ω phones. (The filters are too noisy to be inserted between the MMD's diode product detector and audio amplifier without low-noise AF preamplification between the product detector and the filter.)

I am very pleased with my modified MMDs. Their basic design is good, and their stability, sensitivity and selectivity are excellent when they have been modified as I've described. The input and active audio filters provide a major improvement in MMD performance. Either receiver can be used on other bands with an external converter having "good" IMD characteristics. I have several spare sets of crystals and other components for these modifications. Send an SASE with your inquiry or comments if you want a reply!—Herb Ley, N3CDR, c/o Herbert L. Ley Assoc, Inc, PO Box 2047, Rockville, MD 20852

FEEDBACK: KENWOOD TRANSCEIVERS CAN KEY COMMERCIAL LINEAR AMPLIFIERS

□ In "An Improved Circuit for Interconnecting the SB-200 Amplifier and Solid-State Transceivers," (*QST*, May 1989, pp 48-49) Richard Jaeger, K4IQJ, mentions that he interpreted our reference to the low-current capability of the TS-940's amplifier-keying circuitry as meaning "low voltage." We feel that many of your readers might misinterpret Mr. Jaeger's statement. All Kenwood transceivers are capable of interfacing with any commercially manufactured linear amplifier without the need of an external keying circuit. Our reference to "low current" means just that, and was included so that home builders would not try and use an old Dow-Key-type relay. Our linear amplifier, the TL-922A, uses a relay voltage quite similar to the Heathkit® linears, and does not require any special keying circuit!

Please reassure your readers that the use of such relay switching circuits is not required in the TS-940S or any other Kenwood transceiver when connecting any commercially available linear amplifier. This includes amplifiers manufactured by Heathkit, Alpha/ETO, Henry, Ameritron, Kenwood, ICOM, Yaesu, Drake, ARD, AMP Supply, etc.—Craig L. Martin, KR6T, Customer Service Manager, Kenwood USA Corporation, PO Box 22745, Long Beach, CA 90801-5745

SPEAKER SWITCHING AVOIDS RFI PROBLEM

□ My Heil SS-2 sound system suffered RF interference when I operated my linear am-

⁵W. Hayward and J. Lawson, "A Progressive Communications Receiver," *QST*, Nov 1981, pp 11-21. Also see Feedback, *QST*, Jan 1982, p 47; Apr 1982, p 54; and Oct 1982, p 41. This receiver also appears on pp 30-8 to 30-15 of *The 1989 ARRL Handbook*.

⁶R. Lewallen, "An Optimized QRP Transceiver," *QST*, Aug 1984, pp 14-19. Also see Feedback, *QST*, Nov 1981, p 53.

⁷G. Collins, "Getting Started on VHF: A Tunable I-F for VHF Converters," *QST*, May 1982, pp 32-34.

⁸W. Hayward and D. DeMaw, *Solid State Design for the Radio Amateur*, 2nd printing (Newington: ARRL, 1986), pp 237-241.

⁹See Note 5.

¹⁰D. DeMaw, "Understanding and Using Audio Filters," *QST*, Apr 1983, pp 45-48.

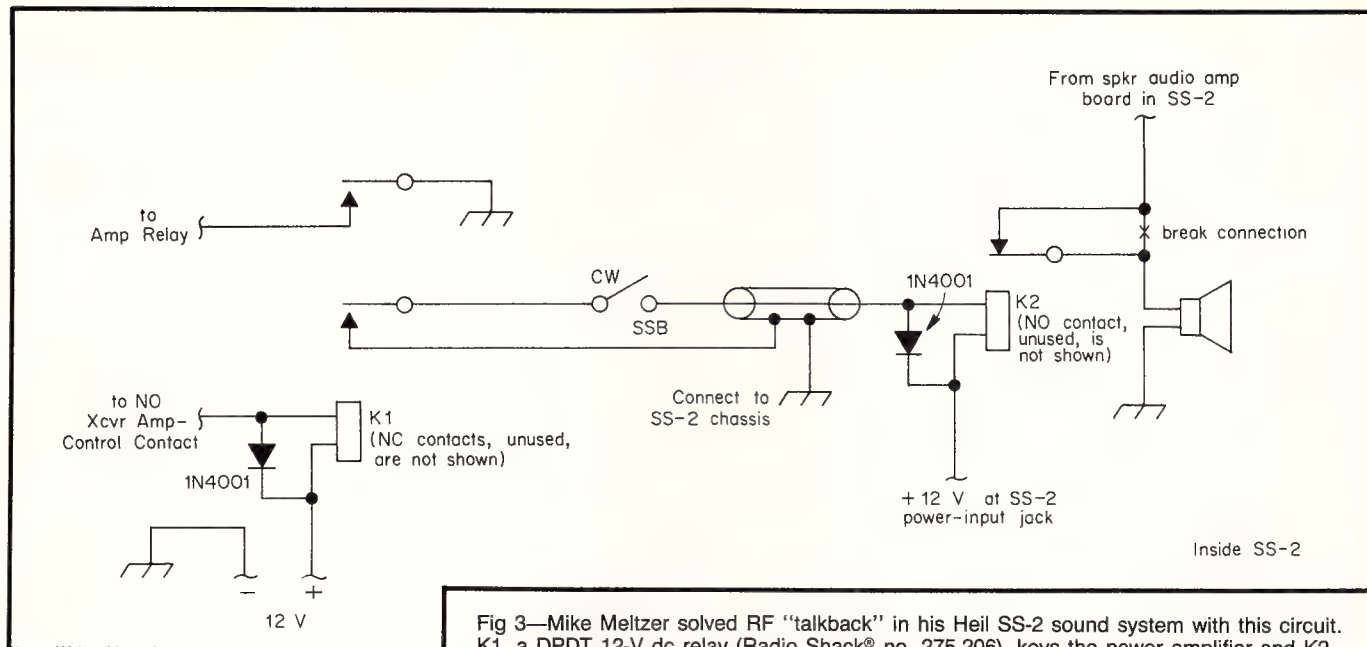


Fig 3—Mike Meltzer solved RF "talkback" in his Heil SS-2 sound system with this circuit. K1, a DPDT 12-V dc relay (Radio Shack® no. 275-206), keys the power amplifier and K2, a SPDT 12-V dc relay (RS no. 275-248) mounted inside the SS-2, disconnects the SS-2's speaker in transmit. S1 disables the speaker-cutoff relay for CW operation. The diodes clamp the transients that occur when K1 and K2 are switched off. See text.

plifier. Installing bypass capacitors and ferrite rings and beads, and grounding the SS-2's chassis, did not help. Unable to cure the illness, I decided to work on its symptom.

Most MF/HF transceivers include a relay or transistor switch that's intended to control an external power amplifier. I used this feature to key an *outboard* DPDT relay, which, in turn, keys the amplifier and actuates a second relay mounted inside my SS-2. The inboard SS-2 relay disconnects the SS-2 speaker in transmit. No speaker connection, no RFI! (Fig 3 shows the circuit.) Not wanting to drill holes in my SS-2, I rewired the external speaker lines in the SS-2's DIN jack to carry the drive for the speaker-disabling relay (K2).

I have modified five Heil SS-2 systems as described here for myself and my friends, and we are all very happy with the results. One system can be modified in two to three hours; the parts necessary for the modification cost under \$10.—Mike Meltzer, K2SDD, 121 Clearview Rd, Dewitt, NY 13214

18-MHz COMPONENT VALUES FOR THE HANDBOOK VXO CW TRANSMITTER

☐ Yes, the 1989 ARRL Handbook's 6-watt, VXO-controlled CW transmitter¹¹

works well at 18 MHz. Here are component values necessary for using the rig on this band; the component designators listed are those shown in Fig 48 of the *Handbook* write-up:

C1—VXO tuning capacitor; 50 pF.

C2—Limits the VXO tuning range to ensure that the crystal, and not L1 and C1, controls the oscillator frequency. I omitted this capacitor in the version I tested; if you try this and your crystal loses control, use 10 pF.

C3, C4—VXO feedback capacitors; 39 pF, silver mica or NP0 ceramic.

C6—Interstage coupling capacitor; 39 pF, silver mica or NP0 ceramic.

C17, C18—Output filter capacitors; 190 pF, silver mica (10 pF in parallel with 180 pF).

L1—VXO inductor; 28 turns of no. 26 enameled wire on a T-37-6 toroidal, powdered-iron core (measured inductance, 2.5 μ H). Space the turns on this coil, and those on L3-L5, to allow a 30° gap between the beginning and end of the each winding.

L3, L5—Output filter inductor; 16 turns of no. 24 enameled wire on a T-37-6 core (measured inductance, 0.85 μ H).

L4—Output filter inductor; 20 turns of no. 24 enameled wire on a T-37-6 core (measured inductance, 1.28 μ H).

Y1—Parallel-resonant fundamental crystal, 20- or 32-pF load capacitance. An 18.07-MHz crystal borrowed from Zack Lau's QRP Three-Bander (see pp 25-30 of October 1989 *QST*) provided a VXO swing

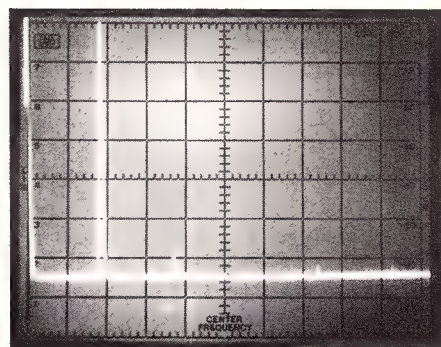


Fig 4—Spectral display of the ARRL Handbook 6-W VXO transmitter operating at 18.09 MHz. Each horizontal division represents 10 MHz; each vertical division represents 10 dB. The spike at far left (the spectrum analyzer's first-local-oscillator signal) serves as a convenient "0 MHz" reference. This spectrogram was taken with the VXO transmitter producing 6.2 W of RF energy. All harmonics and spurious emissions are at least 57 dB below peak fundamental output. Modified for 18 MHz as described in the text, the 6-W VXO transmitter complies with current FCC specifications for spectral purity.

of 10.8 kHz with 39 pF at C3 and C4.

Powered with a 12.0-V dc supply, my version of the VXO transmitter draws 1.26 A dc while producing 6.2 W output at 18.09 MHz. Fig 4 shows the transmitter's output spectrum under these conditions.—AK7M

¹¹B. Hale, ed, *The ARRL Handbook for the Radio Amateur*, 1989 ed, (Newington, ARRL, 1988), "A VXO-Controlled CW Transmitter for 3.5 to 21 MHz," pp 30-43 to 30-45.

The publishers of QST assume no responsibility for statements made herein by correspondents.

STABLE HEXFET RF POWER AMPLIFIERS

□ In a recent article,¹ Doug DeMaw described RF power amplifiers using the IRF511 HEXFET®. DeMaw encountered two major problems with the circuits. First, stability was very difficult to obtain. Second, he could obtain reasonable output power only when using a 24-V power supply. Our experience with HEXFET amplifiers is much more optimistic than that reported by DeMaw. Stability is ensured if low resistance, noninductive terminations are used. Useful output power is available from amplifiers operating from 12-V power supplies if a higher device quiescent current is used.

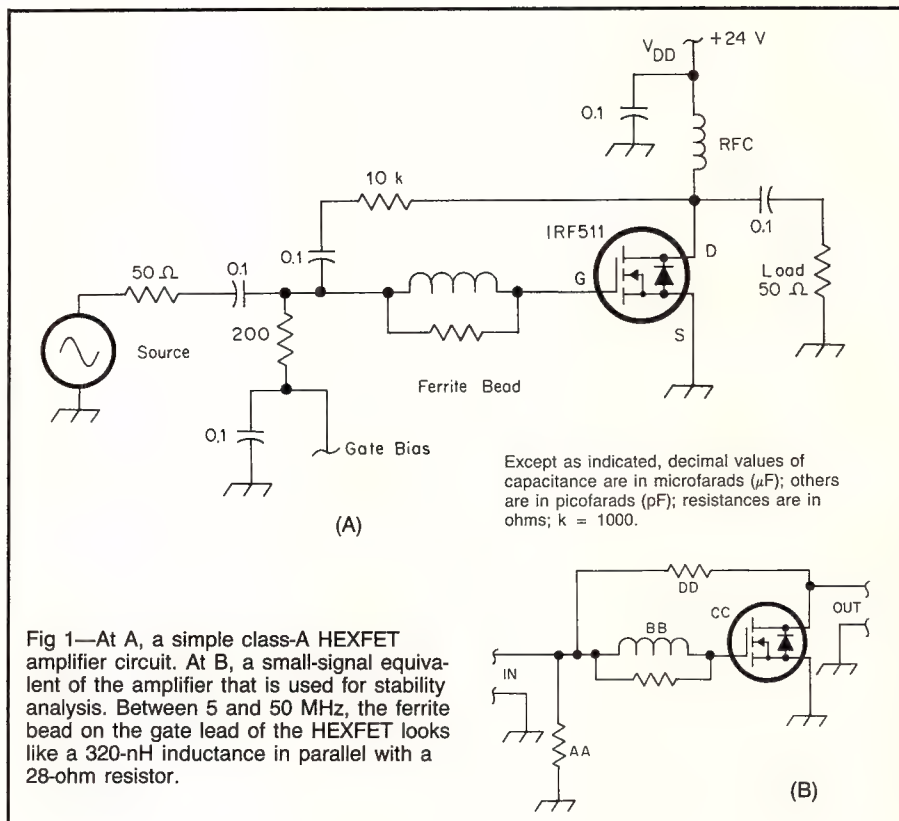
Stability

Fig 1A shows a simple amplifier resembling that used by DeMaw. Our circuit is simpler, but offers the same salient features. Most RF power amplifiers operate in class AB or C. The amplifier of Fig 1A is a class-A circuit. Class-A operation is chosen because the circuit is more easily modeled with available software tools. The circuit of Fig 1B—a small-signal equivalent of the amplifier of Fig 1A—is used for stability analysis.

RF data is rarely available for general-purpose power FETs. However, large-signal SPICE models are now available for many FETs.² We created a SPICE file and performed an ac analysis to extract the scattering parameters for the IRF511. The 4.31-V gate bias used in the circuit of Fig 1A sets the bias current to 0.5 A.

The other unknown in the circuit of Fig 1A is the ferrite bead. Most radio amateurs use such beads, but rarely take the time to carefully model them. We placed an Amidon FB-43-101 bead, a common part, on a small wire loop at the end of a piece of coaxial cable. The bead was then characterized using an HP8753B network analyzer. In the 5- to 50-MHz frequency spectrum, we discovered that the bead looks like a 320-nH inductance in parallel with a 28-ohm resistor.

The FET scattering parameters and the



bead model were used in a small-signal, two-port-amplifier analysis of the circuit of Fig 1B. For this analysis, we used a program called SuperStar.³ Table 1 shows the SuperStar circuit file and Table 2 contains the tabular output data. Circuit gain is high at low frequencies, but decreases as we move through the 5- to 50-MHz range. The Rollett stability factor, K , is especially significant: A value greater than 1 indicates unconditional stability; a value less than 1 warns of potential oscillation. The data shows that the amplifier is unconditionally stable at frequencies over 15 MHz, but is potentially unstable at lower frequencies.

Although an analysis indicating potential instability is useful, it is incomplete. What we really want to know is what we can do to stabilize the amplifier. The solution is partially shown in Fig 2. This is an input-plane stability-circle plot. It shows, in Smith Chart form, the impedances presented to the amplifier input that cause instability. The 5-MHz stability plot shows that the IRF511 amplifier is potentially unstable when the input is terminated with an inductive reactance. Impedances inside the stability

Table 1
HEX511.CKT Circuit-Parameter Input to SuperStar

```
CIRCUIT
RES AA PA 200
PRL BB SE 28 320 'FERRITE BEAD
TWO CC SP 50 'IRF511.SPI
RES DD SE 10000
PAR CC DD
CAX AA CC
OUTPUT
DSP AA SK 50
FREQ
SWP 5 50 10
```

circle are the unstable ones. The circuit is stable when loaded with capacitance.

Recall that the ferrite bead is modeled as a lossy inductance. Fig 2 shows that the bead is too inductive in this application. Replacing the bead with a 10-ohm resistor resulted in an unconditionally stable amplifier. K is greater than unity at all frequencies. The ferrite bead, a component that we always assume to be a stabilizing influence, can actually be the source of major instability. The beads

¹D. DeMaw, "Power-FET Switches as RF Amplifiers," QST, Apr 1989, pp 30-33. Also, see Feedback, QST, May 1989, p 51.

²SPICE is a general-purpose, nonlinear circuit analysis program originated at the University of California, Berkeley. The version used by the authors is PSPICE from MicroSim Corp, 23175 La Cadena Dr, Laguna Hills, CA 92653, tel 714-830-3855.

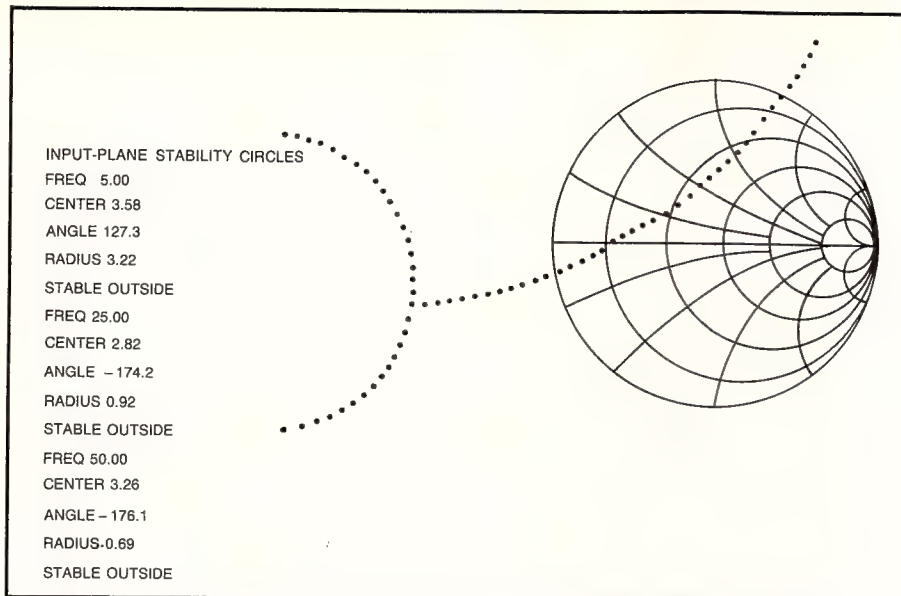


Fig 2—An input-plane stability-circle plot. It shows, in Smith Chart form, the impedances presented to the amplifier input that cause instability (see text).

Table 2

Screen Dump of HEX511.CKT Run Under SuperStar

== = SuperStar == = Mon Apr 24 07:52:47 1989					
FREQ(MHz)	S11 dB< ANG	S21 dB< ANG	S12 dB	S22 dB< ANG	K
5.00000	-2.9098< -173.54	24.073< 103.75	-32.077	-1.5859< -150.42	0.2290955
10.00000	-4.6441< 162--66	15.691< 83.280	-32.927	-1.2958< -168.52	0.6125636
15.00000	-6.3850< 158.86	12.888< 82.314	-33.792	-1.3748< -171.29	1.176323
20.00000	-7.5986< 158.07	9.8696< 81.919	-34.317	-1.4337< -173.60	1.959576
25.00000	-8.4068< 158.17	6.0710< 80.051	-34.631	-1.4646< -175.69	3.293028
30.00000	-8.9930< 160.10	5.0852< 80.854	-34.827	-1.4776< -175.97	3.878258
35.00000	-9.4077< 161.91	4.1724< 81.480	-34.958	-1.4868< -176.20	4.449523
40.00000	-9.7070< 163.47	3.2223< 81.850	-35.048	-1.4934< -176.41	5.073209
45.00000	-9.9276< 164.79	2.2036< 81.970	-35.113	-1.4980< -176.62	5.791251
50.00000	-10.093< 165.88	1.0850< 81.829	-35.161	-1.5011< -176.82	6.658419

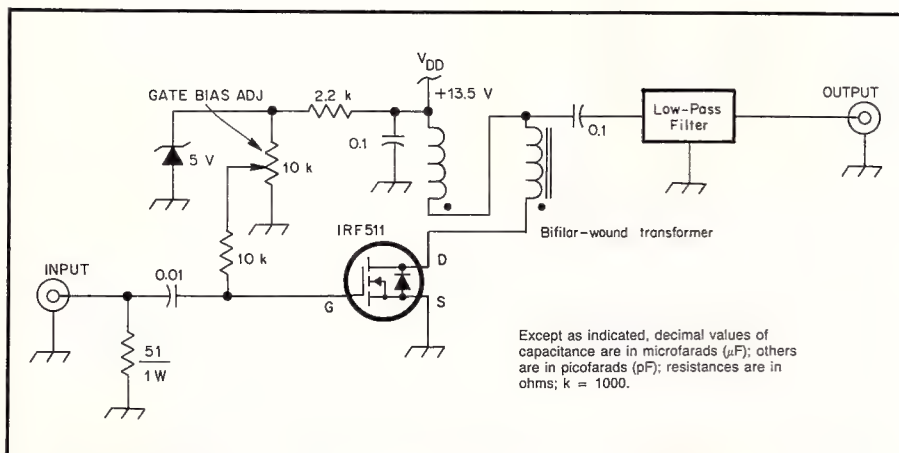


Fig 3—This amplifier circuit has been used in several portable 75- and 40-m SSB transceivers, and is capable of an output of 8 W CW or SSB PEP up through 14 MHz, with a 13.5-V supply.

are certainly useful components, but they should not be used with casual abandon.

Practical Results

The esoteric analysis presented was done to satisfy our curiosity. This occurred after we had built numerous successful power amplifiers with the IRF511. A class-A analysis is a useful guideline, even when it differs from the class-AB circuits we might build.

Fig 3 presents an amplifier typical of those we have built. The IRF511 is driven from a 50-ohm source, is stabilized with a 50-ohm input resistance, and has a drain load of about 12 ohms. There's a 2:1 turns-ratio transformer at the output, followed by a low-pass filter. This amplifier has been used in several portable 75- and 40-m SSB transceivers, and is capable of an output of 8 W CW or PEP on SSB up through 14 MHz, even when a 13.5-V supply is used. This amount of output power is only available, however, if a quiescent bias current of about 100 mA is used for the IRF511. No ferrite beads are used. A similar amplifier with a 50-ohm output termination functions well as a 1-W output SSB driver when biased to only 25 mA.

Fig 4 shows a higher-power amplifier for CW applications. This amplifier employs a larger, more robust FET, the IRF530. It's still a cheap part, costing less than \$3 new in mail-order catalogs. A 2:1 turns-ratio step-down transformer provides a low-impedance driver input circuit. An LCC T network is used for output-circuit matching. Both the input and output networks are much like those used with a bipolar amplifier of similar output-power capability.

The amplifier shown in Fig 4 uses a bias scheme introduced in an earlier design.⁴ Part of the bias is derived from RF drive. When RF drive is removed, the drain current drops to very low levels. The internally generated noise also drops, making this circuit especially useful for QSK CW.

The IRF530 amplifier is capable of relatively high power from a 24- to 28-V power supply. We have measured an RF output power as high as 50 W at 14 MHz with a drive power of 1.5 W. Similar output power is available on 80 m when the amplifier is driven with nothing more than a crystal oscillator.⁵ Lower, but useful, output power is available from this circuit with a 12-V power supply.

³SuperStar is available for \$595 from Circuit Busters, Inc, 1750 Mountain Glen, Stone Mountain, GA 30087, tel 404-923-9999.

⁴W. Hayward, "A VMOS FET Transmitter for 10-Meter CW," QST, May 1979, pp 27-30.

⁵R. Culter, "80 M Radio Transmitter uses Power MOSFETs," EDN, Nov 28, 1985, p 280.

Feedback

□ Please refer to *QST*, Sep 1989, Technical Correspondence, "C64 Memory Transplant," p 40, Table 1. An error appears in line 4. The last digit in that line should be 4 as shown here.

4 GET #2, A\$: PRINT A\$; :A\$ = A\$ + CHR\$(0: IF ASC(A\$) < > 13 THEN 4

(tnx Don Goshay, W6MMU)

□ J L Manufacturing reports that our New Products announcement of their Vise-Brake (p 71, Sept 1989 *QST*) was in error: We listed an incorrect toll-free telephone number. You can reach J L Manufacturing at 408 Hawk St, Bldg D, PO Box 561203, Rockledge, FL 32956-1203, tel 800-780-3877 or 407-631-3877.—Rus Healy, NJ2L

□ In the parts list of Fig 1 of "A 1.25- to 25-V, 2.5-A Regulated Power Supply," *QST*, Sep 1989, Q1 is identified as an NPN transistor. It is a PNP transistor. (Tnx W5XW)

Note: All correspondence addressed to this column should bear the name, call sign and complete address of the sender. Please include a daytime telephone number at which you may be reached if necessary. QST

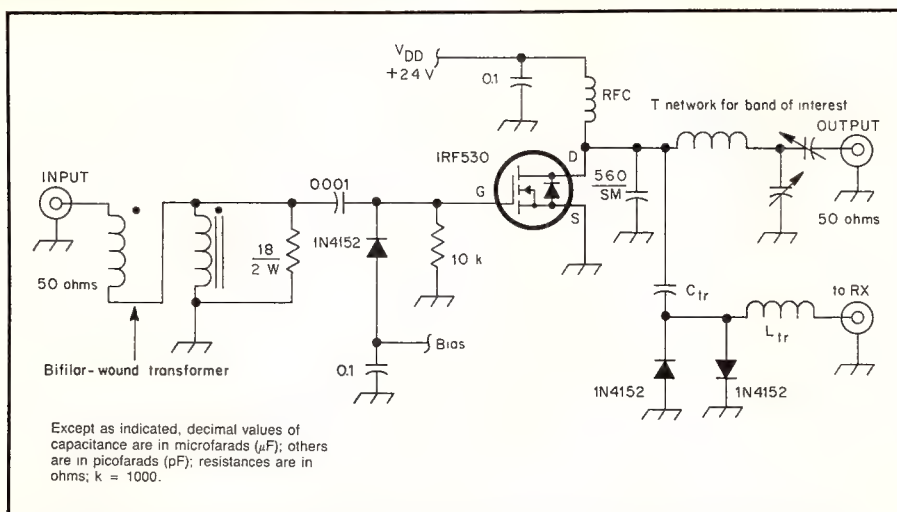


Fig 4—A high-power amplifier for CW applications. Using a 24- to 28-V power supply, RF output power as high as 50 W at 14 MHz can be obtained with a drive power of 1.5 W.

There's a TR circuit in the amplifier shown in Fig 4. The reactance of L_{tr} and C_{tr} is each about 500 ohms. We measured a receiver path-insertion loss of less than 1 dB for this circuit. The power available at the receiver antenna terminal is around -10 dBm, low enough to avoid receiver damage. Receiver IMD measurements suggest an input intercept of over +10 dBm for this circuit. This is strong enough for most amateur applications.

Our experience with medium-power amplifiers using inexpensive FETs is very

encouraging. They are generally easier to use and tame than bipolar transistors at similar power levels. Stability is ensured by a low-impedance gate-drive design without excess inductance in series with the gate. Amplifier performance is improved when higher-voltage power supplies are used, but practical results are still possible with 12-V power supplies.—Wes Hayward, W7ZOI, 7700 SW Danielle Ave, Beaverton, OR 97005, and Jeff Damm, WA7MLH, 18025 NW Bronson Rd 01, Portland, OR 97223

Some Power-Supply Design Hints

(continued from page 31)



Fig 5—A view of the interior of the 15-V power supply. The regulator IC is mounted on the vertical heat sink bracket. Point-to-point wiring is used in place of PC-board construction.

and there is an internal L bracket drilled for two TO-204 cases. There is also an internal clamp that can be used to hold an electrolytic capacitor. These items can be removed easily by simply drilling out the rivets that hold them to the main chassis. N8HLE has a few hundred of these boxes at a reasonable cost, should you want one or more.² They are excellent for all manner of home projects.

I hope this article has given you some helpful hints you can use for solving your power-supply problems. It is important to use a large enough regulator heat sink to permit the IC to operate cool or warm, but never hot! When in doubt, use a larger heat sink than you think is necessary.

Notes

¹FAR Circuits (N9ATW), 18N640 Field Ct, Dundee, IL 60118, tel 312-426-2431. Price at this writing \$6.50 postpaid to US addresses.

²South River Electronics, 320 S River Rd, Tolland, CT 06084; \$3.50 ea, plus shipping. QST

The Importance of Being There

A modest station and nearly a half-century of uninterrupted hamming have made W1GKK the all-time DXCC leader. With uncommon persistence he has accomplished a feat that few hams, if any, can ever hope to match.

By Rick Booth, KM1G
232 Washington St
Norwood, MA 02062

It takes 310 confirmed DXCC countries to be on the League's Century Club Honor Roll. George De Grenier, W1GKK, not only made it—in the Honor Roll's rarified air, a world of aces, he is the ace of aces, *capo di tutti capo*, Top Gun. His confirmed country total is a staggering 372.

Say *what*? No, that's not a misprint. Three-seven-two, mixed phone and CW, that's his total, confirmed by the ARRL's DXCC desk. Not 372 worked, mind you, not birds in the bush. We're talking in his *hand*, confirmed. As in on the wall. *He hasn't missed a single country since the bands were reopened to hams after WW II.* George De Grenier is a patient, consistent DXer.

Don't get discouraged. He didn't get them overnight. George has been in Amateur Radio since the 1930s, and into DX almost as long. But the total count isn't the sole surprise waiting in George's story. Of his 372, every single one is on 20 meters. Only in the last couple of years has he launched himself on a second career, hunting new countries on 75 meters. He's not too shabby there, either, despite having almost the simplest of stations. George doesn't have the biggest signal on the band. He's not a *big* gun. Just the *top* one.

I got my first clue to his achievement's magnitude from the road by George's house. The place is glued on a Berkshire slope in the shadow of Mount Greylock in Massachusetts, a long putt from Vermont and an easy chip from New York. The driveway fell away so steeply, the peak of his three-story, tar-shingled place in North Adams was level with my eyes, a house undistinguished from thousands in mill-worn New England hamlets. No skywalking tower set it apart from its cheek-by-jowl neighbors. No six-over-six, either. George was never into big arrays. He could never afford them. Not then, 50 years ago when he started, and not now. What he *is* into, what's put him at the very top of a very special heap, is *being there*.

"That's the secret," he told me from an easy chair in his incredibly simple shack.



George De Grenier poses with the latest version of his "Top Gun" station. Check out George's DXCC awards. Have you ever seen so many endorsement stickers? (photo KM1G)

"If they're there, and you're not, you're not going to get them." So simple. Yet so true. I felt like the pilgrim who struggled to a mountain sage, only to learn a truth so obvious one wonders at its elusiveness.

And struggle I had, east on the Mohawk Trail, cross-compartments through the Berkshires, grey sky straight overhead, tree-laden slopes all around. Just finding North Adams was work. Told about my trip, George allowed, "Those mountains to my south really do a job on my signal."

To get to the summit, you need steel. A little aluminum doesn't hurt, either, and some wood, and handy hands, all within George's lifelong reach. He looked at the QSL cards ringing his shack, two rows near the ceiling like molding. I'd been reading them, my ham glands salivating.

"Oh, I only put them up there if they're dupes, if I've got others in the drawer there. Only took me 50 years and six towers. Four of them wood. This"—he pointed upward—"is my first store-bought antenna."

I'd seen the four-element Cushcraft from the road. I'd had to look for it, a monobander, nearly invisible against the grey mountains behind.

I saw his QSL files, too. Amazing.

Thumbing through, I happened to hit the JYs, Jordan. Nothing special, really, not to an Honor Roller. But a country most hams wouldn't turn down. Some of the cards sported photographs, and a familiar face arrested my eyes. I yanked it from the group. On it was a single proper noun, hand-written: Hussein. That's King Hussein, ruler of the history-laden Mesopotamian country, and holder of the famous call sign JY1.

Amazing hobby, this, where relative paupers talk to princes. George's parents emigrated from Canada, looking for mill work and a better life. George and Mary wed, were in the early stages of what would be five children (none of them hams, alas), when his mother's health began to fail. "There was a mortgage on this place, so she asked me to take it over, keep it in the family. I've been here ever since."

That was the only move 1GKK ever made, and it was long, long before the legend was even thought of. Things were a little different in those days: "We all went to Catholic schools. French in the morning, English in the afternoon. And double the homework. The nuns saw to that." George can still *parler Francais*, but he said it never helped him capture QSLs, not even the

Terrible Ts, those elusive French-speaking Africans. Every one of whom George eventually got, of course.

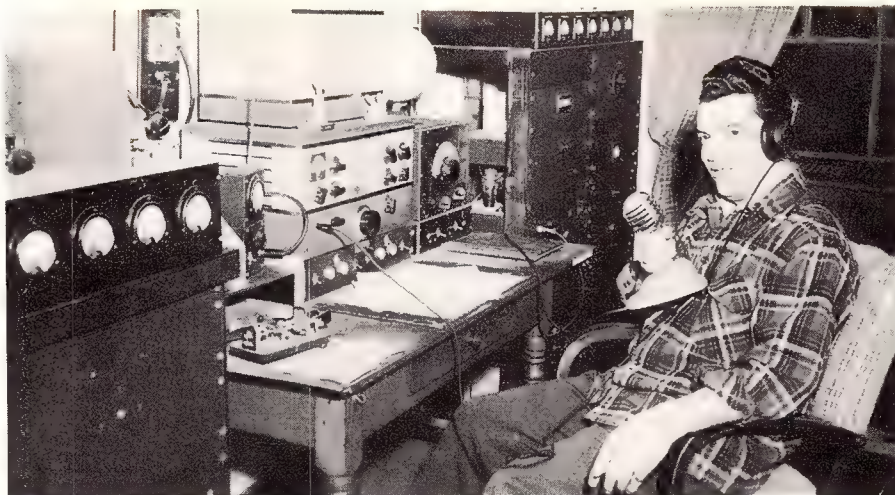
There were a lot of rigs over the years, most of them home-brew, with the occasional kit and the odd Viking Ranger thrown in. George built his own antennas, too—he had an edge.

“I worked for years in a metal fabricating place. It’s gone now, closed up. But they always had this aluminum tubing around, and I could weld and everything. So, I always built my antennas. Towers, too. Always one band, 20. I wanted DX, and that’s where the DX was. On 20.”

Not a few DX legends have been borne on the forbearance of employers, or by the self-employed, and W1GKK was no exception.

“I never missed work, no. But I knew the game pretty well. If I knew something was going to happen during the day, I’d plan it right. I’d set up a job, and then while the job was going I’d be back here, calling the DX. Then I’d go back to work.” Lucky for the legend, George didn’t spend a lot of time on the graveyard shift. At least, not on the company clock. On microphone and key, there was midnight oil aplenty. On the band, he nearly always got his man. Or woman, as the case might be. Other than persistence, he can’t say why.

Getting them, as any DXing veteran knows, is one thing. Confirming them is quite another. George freely admits it may be the harder part of the art. “Longest I ever waited? Seven years. That was for Tibet, AC4NC. You can’t get it now. It’s on the Deleted Countries list.”¹ George pointed to it, on a brand-new, golden DXCC Countries List from the League. I



Here’s what De Grenier and his station looked like in the early ‘50s. Back then, George was persistently working many of the countries that are now on the deleted list, the ones most of us will never work.

was almost afraid to ask. How many did he have from the deleted list, the ones you not only don’t have, but can’t ever hope to get?

“Oh, I’ve got all of ‘em,” he said. Matter-of-fact. Doesn’t everybody?

Not surprisingly given a half-century ham career, George tends to think of his life in terms of periods. There were the early days, before the war and DXCC. Then postwar, then the period when he ran the W1 QSL Bureau, a job he only surrendered in the 1960s. That might explain some of his successful QSL work. But it was work. It didn’t keep him away from the rig, though. The shack wasn’t on the second floor then, just off the living room, not with five kids. It was in the attic, and there was a room for card sorting up there. “I’d tune the rig on the frequency where I knew a new DX would be, then turn the receiver gain way up and come out here to sort. Then when he came on, I’d run in and nab him.”

There were darker times, too, as in the 60s when DXing scandals so disgusted him he left the air. “I wasn’t alone. Lots of guys, good guys, left, too.” The scandals toughened DXCC confirmation requirements.

He never intended to return to the air, but one of his four sons, though not a ham, rescued W1GKK. He sold a stamp collection, and bought his father a new transceiver—the radio he uses today, a Kenwood TS-830S, with an outboard VFO. The Kenwood drives a Heathkit SB-220 amplifier (“Bought it for a song, and it runs great”). That’s all George ever runs. He has but two antennas, the Cushcraft and, lately, his 75-m coax-fed inverted vee. A Kenwood MC-60 mike, an old black homebrew keyer, a Barker & Williamson coax switch. That’s it.

He doesn’t get any more DX bulletins, either, though he used to. In fact, George used to be up on whatever was on the band, if not by the printed word, then by simply being QRV, being *there*. His biggest

moment was in the 80s, when the manager for his 370th contact—KP2A, Desecheo—presented the precious card in the presence of the League’s top brass, in Newington. No sooner was the deed done than George’s mailman brought another missive, one most DXers would consider every bit as precious as any QSL: congratulations from no less than a then-living legend, Don Wallace W6AM.

Lofty company, that. George followed my eyes across his station, and up to the framed DXCC certificate. It’s pretty startling to see a “370” endorsement sticker, and I guess my face showed it. George smiled.

“Don Search (ARRL DXCC Manager) has to have those stickers printed in batches of 50,” George remarked. “He asked me what I thought he should do with the other 49.”

It was the closest George came to humor. He is a serious man, and not especially sociable. He’s turned down invitations to be guest of honor at DX gatherings. It’s understandable. He isn’t as young as he used to be. He quit smoking a dozen years ago, but emphysema is a nagging worry. At age 73, a *lot* of things are a nagging worry. But DX isn’t one of them, at least not like it used to be. After all, how many of us, asked our country total by someone who knows we count them, can offer the W1GKK answer:

“All of them.”

Notes

¹At the time of this writing, the number of current DXCC countries totals 321. Countries on the Deleted List total 51. A country is deleted when, through changes in government or other rules interpretations, it no longer meets the conditions necessary to remain an active, current country. So today’s DXers, who may not have been on the air in the ‘50s and ‘60s, have no chance of working all possible DXCC countries. DXCC’s Don Search, W3AZD, says up to 400 hams have worked all of the current DXCC countries, although he knows of no other ham who is in a position to “work ‘em all.”



De Grenier’s signal has been emanating from this house, located in the Berkshire Mountains of western Massachusetts, since at least 1945—an era that saw the end of WW II and the birth of ARRL’s DXCC program. The 4-element Cushcraft Yagi is George’s first store-bought antenna.

Herb

By Ken Stuart, W3VNN

ARRL Technical Advisor
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I was there, that afternoon, when they took Herb away.

It was sort of cold that day; a stiff breeze was blowing and clouds filled the sky. I stood in the shelter of a tree across the street from Herb's house. I watched as the white van drove up. Two men got out and went inside. It hadn't taken them long to get there; I had placed the call only about an hour earlier. A little later, Herb and the men came out and walked toward the van. I caught a few strands of their conversation as they crossed the lawn: "Wow! You guys could really set up a great mobile station in that thing—amplifiers on all bands, even!" It was obvious to me that the drivers had followed my suggestion as to what to say to him—about visiting their all-band packet station—since Herb was cooperating fully and was even eager to go with them.

After the van pulled away, I felt sort of like a traitor, having signed the papers for his hospitalization. But I knew it was for the best. Things just couldn't be allowed to keep going the way they had been. I knew they'd take good care of him, but the rest of the guys in the club and I would really miss him.

Once the van was out of sight, I turned and started the long walk home. With each step, memories poured forth—about how Herb had grown increasingly preoccupied about what was supposed to be just a hobby. For him, ham radio became an obsession. It occupied his every waking hour. Worse yet, I realized that I was the Elmer who had started him along the path which now led to the Babbling Brook Home for the Nervous!

It started about three years ago, when Herb had been present in a group of Cbers assembled at the local library to hear my talk on ham radio. I seem to recall that he was the most enthusiastic participant, hanging on my every word and asking endless questions after the talk was finished. Sure enough, he appeared at the next meeting of our club, the Fraternity of Amateur Radio Communicators and Experimenters, paid the required dues, and was voted into membership. After that, he never missed a meeting and participated in all the club activities. He even stayed the full two days for field day. As time went

on, his operating skills improved, and he quickly claimed WAS, DXCC and many other certificates. We began to notice, however, that his lifestyle was changing. His eyes were frequently red from late-night QSOs and DXing, and his clothes, once neat and clean, were often coffee stained and smelled of tobacco smoke. Herb's conversations became less coherent, and we suspected that he was using something stronger than coffee to keep him going on his late-night stints.

Anyway, a few months ago, some of us guys happened to be talking when Jim, our club's ARES officer, mentioned Herb. It seems that he and Herb were helping to provide communications for a canoe race down at the lake. They were at the finish line waiting for the first of the contestants to come around the bend, when the battery in Jim's HT gave out. While he was rummaging around in the trunk of his car for another battery pack, the first canoeist came into sight. Herb immediately grabbed an unattended fishing rod (rather than his HT), stuck the reel up to his mouth, pushed the line release lever and yelled into the reel: "Here they come! The red boat with the white stripe is in the lead. Just look at that *\$@(&% paddle!" Jim grabbed his HT and quietly moved to the other side of a nearby hill, out of Herb's sight, where he

finished reporting the race.

Right about now, we decided that Herb needed a little diversion to break him out of the rut he was in. Possibly some sort of social activity. A girl, perhaps. We compared notes and came up with a vict...er, uh, date for him.

The chosen Fair Flower of Womanhood was perfect for the task at hand. Delores was a year or two younger than Herb, and the words "ham radio" were not in her vocabulary. She had also seen him once or twice at the supermarket, so it wasn't exactly a blind date. The affair would be a buffet and dance held at the local social hall. Just to make sure that everything went okay, Jim and I found dates for ourselves and went along.

Aahhh... there was magic in the air! The hall was nicely decorated, the music delightful and romantic, and Herb actually seemed to be coming out of his shell. He even talked about nonham things. Things were looking good between Herb and Delores, too. He was complimenting her on her dress and hair; she was telling him that he had a nice tie. It looked as if the evening was going to be a success, and Jim and I were congratulating each other.

That's when it all blew apart.

The two of them were out on the dance floor. Her eyes were closed as she floated



on his arms. As I watched Herb, his eyes suddenly turned glassy, and I knew that mentally, he was no longer with us. I think he had a sudden inspiration about the link between his TNC and computer, a problem he had been discussing with me a day or two before, because he suddenly let go of Delores, looked over at me, and shouted, "I know what the problem is—the baud rate's all wrong! Yeah, the baud rate's no good!" Delores slapped him, whirled and walked out of the hall—and out of Herb's life. But Herb hardly noticed.

While walking along, I thought about the events of that very morning when I had dropped by Herb's shack to see the new linear amplifier he had built. He greeted me at the door and guided me through the vast array of electronic gear littering the floor. We had to step gingerly over runs of coax and cables, old logs, textbooks, and an uncountable number of magazines, until we finally came to his equipment table. On the table itself and, stacked floor to ceiling nearby, were racks and shelves full of surplus equipment and stuff he had built himself. Everything seemed to be connected together. The cooling fans, humming transformers and clacking relays were so loud we had to raise our voices to be heard. "Looks great, don't it?" he said.

"Yeah, Herb," I replied. "I don't think I've seen this much stuff in one shack since I saw pictures of an old '20s spark station."

"Hey," he said, "I've got one of those old rotary spark gaps over in the corner, somewhere. Wanna fire it up?"

I declined.

Anyway, he went on and explained that the stuff in the rack to the left of the table was his DX machine, something he had invented himself, something that was responsible for his phenomenal success as a DXer. Looking over the apparatus, I saw a surplus BC-375-E transmitter, a couple of tube-type CB radios, an impossible tangle of wires and coax, and two tubs from old washing machines. "The washing machine tubs make cavity resonators for fifteen and ten meters," he explained. "They're a special design I thought of myself. I tune 'em by turning vanes screwed to the agitators. Oh yeah, don't get too close to those bare wires going up to the ceiling. They tie into the 3000-V plate supply over on the far wall." Herb tried to explain how the system worked, but it was beyond me—something about how he could get DX on the higher-frequency HF bands at any time day or night by using the DX machine to create his own ionization layers in the ionosphere.

It was time. I knew what I had to do. I slipped out while Herb was QRZing a G3 station and made the phone call.

Well, time went by and occasionally we got word on Herb's progress. It seems that with the break from ham radio, he was responding to treatment and was almost

The hospital even used shock therapy a time or two, but strangely enough...the equipment seemed to have no effect

back to normal. He still talked to the doctors about DXing and packet and so on, but now it was in a quiet, controlled manner. In fact, the hospital suggested that we might try exposing Herb to a bit of radio activity—to see how he reacted—sort of like a little outside therapy. We discussed it at the next club meeting, and decided we would let him ride shotgun at the upcoming fox hunt. Arrangements were made with the hospital. He would be released the next day. Charlie volunteered to let Herb ride with him.

On that fateful morning, Charlie showed up at the hospital parking lot and picked up Herb about a half-hour before the hunt was scheduled to begin. Charlie had brought his direction-finding antenna, which consisted of a garbage can lid with a duckie antenna mounted on the inside, sort of like a radar dish. You hold it by the handle and swing it around until you get the best peak, or better still, the best null when it is pointed exactly away from the transmitting station. While they sat in the car waiting for the fox hunt to start, Charlie explained to Herb how to operate the antenna by swinging it for the null and checking it against the compass. Every once in a while, one of the attendants would walk by and cast them a curious glance, wondering why they were still parked.

Suddenly the rig in the car burst into action. The fox was transmitting! With a yell, Herb threw open the door, jumped from the car, jerked out the garbage can lid antenna, held it at arm's length and swung it around and around. Suddenly he stopped sharply and shouted in at Charlie, "Over there! the fox is over thataway! It sounds like he's only a few miles away! Let's go!" They grabbed poor Herb before he could get back into the car. Didn't even let Charlie explain what was happening.

By the time everything got straightened out, it was too late. Herb's mind had snapped. He regressed into a ham-radio fantasy world. Treatment became more rigorous. The hospital even used shock therapy a time or two, but strangely enough, after a couple of treatments the equipment seemed to have no effect. It was almost as though it wasn't working. The staff also mentioned that they occasionally heard noises, like clicks and beeps, coming from the shock therapy room late at night. But when they would open the door, no one was there.

One strange thing puzzling the club during this time was that we began to get a lot of


QSLs from the bureau addressed to Herb, in care of the club. We figured that the bureau must be really running behind, since he had been away from any radio equipment for several months. And yet the packages of QSLs were still coming in droves.

Well, summer ended and autumn came and went. We heard less and less about Herb, except that he was making progress. The Winterfest™ committee was burning the midnight oil trying to get everything prepared for the upcoming event. We were over at Joe's house, going over the details for the umpteenth time, when there was a knock at the door.

Yep, it was Herb. He had just been released a couple of days ago. We invited him in, sat him down and listened as he filled us in on the last few months. He told us that one of the doctors had talked to him at length about his ham-radio condition. For him, it was an addiction, just like alcohol. As long as he renounced ham radio completely he would be okay. But the doctor warned him that if he got even a little bit involved, a relapse was certain. The hospitalization would be longer the next time. Herb had already cleaned everything out of his shack. Much of the stuff had been junked, but the good stuff was donated to the club to help get new hams on the air. With that, he handed me a cardboard box he had brought with him. With a tear in his eye, he explained, "Al, you helped me get started in ham radio, and with everything that's happened, you've stood by me. I want you to have this. It's a miniaturized version of my DX machine. Thanks for everything." With that, he got up and walked out, leaving us speechless.

Well, that's about all there is to the story. Herb moved to another state, got a real estate license, and picked up his life where he had left off. We still get Christmas cards from him, and we visit him when any of us are in his neighborhood, but we strictly avoid discussing ham radio. I guess that everything worked out for the best, but I still miss him and his enthusiasm.

Oh, yeah. I got around to hooking up the DX machine he gave me—followed the instructions he left in the box. I can't believe how well it works—twenty-meter DX at one o'clock in the morning. Several of us got together and tried to figure out what made it tick, but to no avail. It seems that some of the main parts of the gadget are not ham gear at all, but have some kind of medical electronics company stickers on them.

I wonder where Herb got that stuff... 

Enjoy a Vacation Abroad with an ITHE Host

An International Travel Host Exchange (ITHE) participant can make a foreign vacation a very memorable experience—or maybe you could host a DX visitor.

By Donald P. Jordan, W8KUZ

2623 N Eighth St,
Terre Haute, IN 47804

My XYL and I had been saving for a vacation trip to England. We had been devouring all of the travel literature and had decided upon most of the places we wanted to see and things we wanted to do. We ran across some bargain round-trip airline tickets to London, and quickly decided that we would never get a better deal. I had written to the ARRL a few weeks before and received their latest International Travel Host Exchange (ITHE) list.¹ There were three British hams on the list who lived in or near London, which was where we wanted to spend most of our time.

I wrote to all three operators, with a bit of apprehension, and carefully explained our background, our length of stay, and the arrival and departure times and dates from Heathrow Airport. Admittedly, I felt a bit awkward about imposing upon a family that we had never met, so I emphasized that we did not need to be chaperoned, as we are independent souls who like to strike out on our own and really needed just a place to lay our heads at night.

Eleven days after the letters were mailed, we received a letter postmarked from England. I was so excited to receive such a prompt reply, I dismissed any thought of looking for the letter opener. I tore it open. My heart sank as the brief note explained that their family would be "gone on holiday" and would not be able to host us on those dates.

Four more days passed, and another letter from England arrived. I was trying not to get too hopeful; it was a very pleasant lengthy letter which was profusely apologetic about the fact that their house



Author Don Jordan, W8KUZ (l), and ITHE Host Roger Brown, G3LQP, inspect the boom before attaching the elements. (Photo by Clare Jordan)

was going through some remodeling, and they didn't have the space to host us this time. They did ask us to look them up while we were there. We were getting discouraged. The cost of a hotel room for ten days was definitely not in our budget. Our hopes were pinned on the last family, and we didn't know if we would hear from them.

Two days later it arrived. The size of the letter was about the size of a thank you note commonly found in most stationery stores. It occurred to me that it doesn't take much paper to say no. It said yes! It was a very short note saying call him from Heathrow Airport, and he would give us directions. It was simply signed, "Roger, G3LQP."

Clare, my XYL, and I had many lively discussions for the next few days as we made the final plans and often talked about our host. His letter didn't say if he was married. Maybe he was a widower. Was he a confirmed bachelor, divorced, retired, self-employed? Is he a person of means, of middle class, or does he barely manage to scrape out a meager existence? Our imaginations worked overtime. Maybe he leads a life of crime. Would it be safe to be with him?

Arrival in England

Departure day swiftly came. After a seven-hour flight from Chicago, we landed at 10:00 AM local time. As far as our bodies

¹For more information about the International Host Exchange Program, write the American Radio Relay League, Dept ITHE, 225 Main St, Newington, CT 06111.

were concerned it was 5:00 AM, and we hadn't slept all that well on the plane; we were too excited to feel tired.

After getting our baggage and clearing customs, we made our way to a telephone. I fished Roger's telephone number out of one pocket and found some British coins in another. It took me a while to figure out what coins to put into the phone. Finally, I took a deep breath and dialed the number. I had no idea if Roger would be home. On the second ring his voice came through the twisted pair with this wonderful British accent, "Hello, this is Roger Brown."

It was the beginning of a wonderful ten days that we will remember for the rest of our lives. As luck would have it, we were the same age, he was married, all four of us got along together extraordinarily well, plus Roger and I shared a life long love of chasing DX; in fact, he's on the DXCC Honor Roll. During our first day it didn't take long to learn that Roger had a crank-up tower that he had recently installed. The old tower had been blown down by a storm the year before, and he managed to salvage the driven element, which he had put back on top of the tower. He also showed me a new triband beam that had never been put together. I suggested to Roger that I would like to put it together for him and mount it on top of the tower. The look in his eyes was unmistakably "visions of sugar plums dancing in his head." He indicated that he would have a day off later in the week from British Telecom and, weather permitting, we could work on it then. I assured him that would be fine, and gave him a shopping list of items we would need to complete the job.

For the next four days, Clare and I would get up early in the morning and head into London to take in those sights we had planned to see. We got back late each night, once at 2:00 AM, with smiles on our faces, a song in our hearts and feet that wouldn't speak to us.

The day before Roger's day off, he began feeling pangs of guilt for using my vacation time to work on his beam. I assured him that I was ready for a break in taking in the sights, and Clare was eager to do some shopping on her own. Roger was grateful for my assurance.

A Housewarming Gift for a DXer

The big day arrived, and we were as excited as a couple of kids with a new toy. Roger and I headed for the garden (backyard) and started spreading out the necessary tools and all of the pieces to the antenna. The hardware glistened in the sunlight like a new car.

The slow process began of measuring the distances between traps and element lengths. I had to learn the metric system,

as the dimensions were not in feet and inches. After checking measurements three and four times, we would tighten the pressure clamps at the appropriate places. I enjoyed teaching Roger the art of putting a beam together, and it was obvious he was delighted to learn how to do it.

By the time we reached the point of attaching the elements to the boom, Roger had learned the meaning of "Murphy's Law" and had an unbridled admiration of my patience to deal with the unexpected problems along the way. I have always been amazed that when you do an antenna project, anything that can go wrong will go wrong.

We got the elements attached to the boom, balun installed and coax attached. It was dark. In this part of Europe the sun goes down at about 4:00 PM in December. We reluctantly accepted that it was too dangerous to put the antenna up in the dark, as the working area was very tight and we needed to clearly see what we were doing. Roger didn't have to go to work until late in the afternoon the next day, so we decided we would put it up in the morning. I was dying to know how well it would work. Would the SWR measurements be within acceptable ranges? Did I measure everything correctly in my attempt to learn metric measurements? Would the front to back ratio be what the manufacturer said it would be?

By the time dawn broke the next day, we were at the base of the tower. I had never worked with a crank-up and tilt-over tower before. We dropped the tower down from the side of the house, and the winch worked like a precision Swiss watch. We took off his driven element, removed the weather worn coax and installed the new beam and new coax.

After threading the new coax through the guides on the tower, we slowly winched the tower back up and attached the bracket to hold it firmly to the side of the house. It was far smoother than working with gin poles, pulleys and ropes.

It took a few minutes as we took turns cranking the winch to raise the tower with the new beam to 50 feet. After feeding the coax into the shack, we stood back in the yard to admire our work. The elements stood out from the boom like the wings of a giant eagle. As we stood there in awe of this majestic creation, it suddenly occurred to me that Roger's thoughts were on cracking DX pileups. I was anxious to know how well the antenna worked also.

Testing the Beam

It didn't take us long to decide that it was time to see if it worked as well as it looked; we entered the shack, put the PL-259 on and plugged it into the transceiver. It was

music to our ears as signals on 20 meters came pounding through. So far, so good. I quickly checked the SWR at 100 kHz intervals on 10, 15 and 20 meters. I breathed a sigh of relief as I saw Roger's eyes fill with excitement.


He was poised like a race horse at the starting gates of the Kentucky Derby. I turned the rig over to him, and he quickly nailed a station to run a test with the beam. The station reported that as he turned the beam to the side, his signal dropped off sharply, and off the back of the beam it came up some, but when he rotated it to the front, his signal came up strong. Roger didn't have to say a word. The smile on his face told it all.

We had one final task to complete: install a low-pass filter. Roger had a lifelong problem of RFI, which at one time had caused some real social problems with his neighbors. It hadn't been helped any when the storm blew his tower down and his beam went through the neighbor's roof!

The new tower, when fully raised, put his beam about 40 feet from any television antenna. The low-pass filter would give a little extra added insurance. With the filter installed, we turned the amplifier on, and Roger loaded it to the legal limit. I went to the living room and turned on the television and his stereo. As he transmitted, I checked the TV channels and tuned his radio through the broadcast frequencies. We repeated the procedures on all three bands. I hadn't realized how worried Roger was about this problem until I pronounced it "clean as a whistle." I thought he was going to jump through the ceiling!

We were satisfied that the testing was complete and the results were a smashing success. Roger proudly declared that it was time to celebrate. We did the perfectly British thing to do—had a cup of tea.

An International Experience

In our remaining days, Clare and I would again get up early and take the 30-minute train ride into London. We returned each night and had long visits with our hosts until the wee hours of the morning. As we got to know each other during our ten day visit, it was amazing how closely our life experiences paralleled each other. It was incredible how many things we had in common. We developed a rare closeness only experienced by people who know each other for a lifetime. Departure day came all too quickly. We boarded the plane, and in seven hours we touched down in Chicago; our lives had been enriched far beyond our expectations. We were tired, happy to be safely home, but saddened to have to leave some dear friends behind. Ham radio is truly an international experience, and the ITHE program is a marvelous extension. 

Amateurs Celebrate "We the People"

Thousands of hams and SWLs celebrated the Bicentennial of the US Constitution in a special way—a ham radio way. Were you among them?

By Eileen Sapko
Awards Manager, ARRL

Judging by the number of applications, the "We the People" Worked All States Award is a smashing success. To date, more than 3500 "We the People" WAS awards have been issued. Approximately 150 of these were for shortwave listeners who received a special "Heard All States" endorsement. One-time awards such as "We the People" and the ARRL Golden Jubilee of DXCC have proven to be very popular.

The "We the People" WAS award commemorates the Bicentennial of the US constitution, and is offered for working all 50 states during the period from September 17, 1987, through December 31, 1988. Applications can be submitted until December 31, 1989.

Other than accommodating SWLs, the only other endorsement offered is the very challenging "200" sticker for working all states with special "200" club call signs. A total of 310 hams have qualified to date, including three SWLs and three DX stations: I8ACB, IK8DOI, and OA4OS. See the complete list of stations who qualified for the "200" endorsement.

SOAPBOX

I want to thank you so much for the opportunity to work "We the People" WAS... Many people have really joined to create a wonderful new spirit among amateurs... would you believe a DX pile-up for the state of Minnesota from other countries working "We the People?"... also it was nice not to have to wait for the QSL cards (NOØK). I know there are many who did it much faster, but few with more pride. I work with all indoor antennas... in my condo... (KI6VC). A great award idea (WBØCIW). It was fun, indeed challenging, and we enjoyed pursuing even the "rare ones" like Delaware and Wyoming... I hear the award is even more attractive than the one QST displayed (K4TWJ). This was fun!!! (W4NIM)... went nuts getting Maine (W3FDU). At this time I would like to congratulate you and the League for the new award program... these new activities spark renewed interest for the hams around the world (HC2CG). At one stage I seriously doubted whether or not I would be able to complete the award... I had worked all but Delaware, DC and North Carolina... it

would be a crime to be on the air without a decent antenna so I put the Yagi up again and completed the award within the week... I shall be very proud of this award... ARRL is to be congratulated for introducing this award without the need for QSL cards (VS6CT). Here we are again having spent a most enjoyable week DXing from Macau and I am very proud to have achieved the "We the People" award (XX9CT). Enclosed is my application for the "We the People" WAS award... accomplished

using QRP power, output level of 5 watts, feeding inverted vees on the low bands, and a 2-element home-brew Yagi at 35 feet, which I use on 20/15/10 meters with the help of an antenna tuner... it has required much listening to work these stations (WA1IDP). Thanks for including shortwave listeners in one of your awards programs. We really do appreciate it (KUSØBK). The anniversary of the US constitution will have a very special meaning for me, forever... thank you (NS3X).

WORKED ALL STATES WITH "200" CLUB CALL SIGNS

KC1BS	NB3N	WD5CBL	KA6JDH	N8BEE	WB9QPA
WB1DWR	KU3R	AA5CI	W6JEP	K8BL	W9RCJ
W1FHP	KA3ROX	N5CND	W6KON	W8BZP	K19T
KC1HI	K3SLJ	N5DZQ	WA6LFN	W8CBA	K9VER
KB1KA	KC3TG	AE5E	W6LS	KE8CC	K9WRH
KQ1N	K3TUA	W5EIJ	KT6M	K8CHN	WA9WSJ
WA1NQV	WA3VWA	KD5F	KA6MBF	W8CNL	W9WYN
NG1O	KC3WJ	KG5FX	KG6MY	WB8FBJ	NT9Y
W1XX	K3YBJ	K5GE	N6NXV	W8FO	W9ZGP
NJ1Y	NN3Z	AE5H	N6PVV	N8FQZ	W9ZTL
KA2AJT	WD4AFY	N5HBQ	KD6PY	KA8IAF	NØABE
N2ATF	WD4AHZ	N5HSF	WA6PZK	W8IEC	KEØAH
KK2B	WD4BBE	WZ5I	WY6Q	WD8IFH	KØBUR
W2BLV	WA4BIM	W5KFN	AE6T	W8KST	NØDLS
WB2CJL	N4BJZ	N5KMR	W6TKV	K8LJG	NØELA
N2CVR	KJ4BK	W5KUY	KA6V	K8LP	WDØEMY
K2CYX	WB4BMM	W5KUZ	KI6WY	WG8N	NØFBA
NJ2D	WD4DBJ	NQ6X	NQ6X	KE8NK	WØGAX
WB2DIN	AA4DO	KB5NI	WA6YEO	W8OBI	KØGT
W2FG	W4DYL	WA5NRT	WG7A	WD8REC	WAØGUD
N2FJQ	KJ4EW	K5OVC	K7ABV	WD8RXP	KEØHN
K2FL	AA4FC	KE5PGE	WA7AHF	KB8S	NØHVL
W2FXA	K4FK	KE5PO	KM7B	W18S	WKØI
W2HAZ	W4FLW	WA5QGH	WE7B	WA8SWM	KAØIAR
KD2IM	WA4FWH	KE5RK	KF7BR	NG8T	WØZ
AC2P	KZ4G	W5RKK	N7BSA	W8URM	WØLEO
W2PKM	WD4HRO	WB5VFL	N7BXX	WB8WHJ	WØMLY
WB2QJY	WD4IIO	WB5VUH	W7CSW	W8WOJ	WAØQIT
WA2S	K4JYS	KD5XH	WE7D	K8WOQ	KØRW
KA2SPH	K4KGU	NM5Y	NI7E	WA8ZDL	KEØSR
KA2TFM	KF4L	KF5YZ	K7EHI	W8ZRL	WØSR
K2TQC	WD4LJY	WZ5Z	N7FYU	WB8ZRL	WØSYV
WA2UNP	N4LZL	WT6A	W7GUR	NS9B	KØTVY
K2VV	N4MAD	N6AHU	N7GVV	KC9BD	NTØU
WB2YQH	KA4MBF	WB6AKF	N7HKU	KC9CU	KEØVF
WA2YYR	W4MLA	N6AVU	N7JB	KA9EFT	WØVV
KD3AL	N4MM	AA6BB/7	WA7JUO	N9EWS	WBØYJT
KD3AO	N4MXN	KJ6BI	KB7KU	N9FXQ	WBØZQN
N3BGA	WB4NXG	N6BOI	NW7O	N9FWM	VE1CFQ
KV3D	N4NWT	KI6BU	KE7PB	N9FWW	VE4HQ
N3EHD	W4PSN	N6CFQ	WB7TWM	KA9HFA	VE7YL
KA3ENQ	N4PXV	K6CID	KE7UL	WB9I	VE7CDK
W3GH	KS4S	W6CN	W7ULC	WD9INF	I8ACB
K3HBP	K4SE	W6DDB	KE7UM	W9JZ	IK8DOI
W3HCW	W4WAW	KB6DSX	KT7V	NT9L	OA4OS
W3IVG	KJ4WP	KF6E	KE7X	NW9L	
WA3JRL	WA4WTG	WD6EKR	KK7Y	W9MYG	
AJ3K	KB4WUK	WE6F	W7YOF	WB9NOV	
KZ3K	WA4ZVK	WA6HIB	WA8AEG	WA9OHU	
ND3L	W5ADH	K6ICS	W8AH	KA9OTD	
KC3LM	W5AFK	K6ILM	WA8ANP	KA9PHA	
KC3M	NU5B	K6IR	K8AQM	WA9PSV	
		K6JAD			

SWLs

Francis H. Welch
Gary Szucs
David A. Glow,
KDX1A



Tune in to Glasnost

Part 3: Soviet hams enter new arenas from subterranean to extraterrestrial.

By James D. Cain, K1TN

ARRL Contributing Editor
PO Box 42
Andover CT 06232

On the Richter scale it was 6.1. An earthquake of like magnitude in Mexico City in 1985 killed "only" 4200 people. Yet when the earth moved under Armenia the morning of December 7, 1988, it leveled hundreds of buildings and left in its wake more than 70,000 dead and a quarter million homeless.

This was not a drill.

News reporters found civil defense "pathetically ill prepared to cope." Some people who survived in the village of Lasakhpur froze to death before help arrived, while rescue teams wasted hours stuck in airports or awaiting ground transportation to the quake area. The same fate befell Amateur Radio volunteers—and their gear.

Take repeaters. It is impossible for American amateurs to imagine an Amateur Radio response to a localized emergency without them. Not only do the Soviets have no repeaters, they have few hand helds.

[In early 1987] "We installed a repeater at Moscow State University [MGU]," wrote Leonid Labutin, UA3CR, in *Radio* for February 1989. "The results were excellent. It seemed that a new era was dawning in our hobby. But suddenly a document arrived from the GIE [their FCC] shutting down the repeater—no reasons, no explanations.

"It's simpler to prohibit [than to work out problems]. After all, in our country, unfortunately, people aren't held accountable for prohibitions. But one can suffer for permitting something.

"Such is the logic still today. In my view, an antisocial logic. One that leads to our Amateur Radio lagging progressively behind the rest of the world."

Radio Relaying

Radio senior editor Gennady "Gene" Shulgin, UZ3AU, was one of the first Soviet amateurs to rush to Armenia following the earthquake. Shulgin is a keen observer and skillful writer, as well as a gifted fix-it man. K7JA describes UZ3AU's reaction to a broken radio on the May 1989 J1IFS expedition:

"Someone had misadjusted the ALC on our prototype Japanese transceiver, leading to final amplifier failure. We had no schematic. 'Let me take a look' Shulgin said, peering down at the radio, a bagful of parts in his hand.

"About an hour later I found Gene on the air with the formerly dead transceiver. 'Works OK now,' he said nonchalantly. 'Has new Russian coil.'"

Shulgin wrote of his month-long experience at the Chernobyl nuclear plant in the April 1987 issue of *Radio*, but did not elaborate on actual amateur communications. The article appeared fully a year after the incident.

When avalanches in Georgia took a heavy toll in lives in January and February, 1987, radio was described as the only reliable means of communication. But the Georgian Republic Sport-Technical Club later was criticized for failing to develop Amateur Radio since the snowstorm disaster.

At the earthquake sites, "Personal radio sets were desperately needed," Shulgin wrote, "to organize rescue work and dispatcher communication. . . [Soviet] radios

adequate for youth games and training were woefully deficient for serving devastated towns."

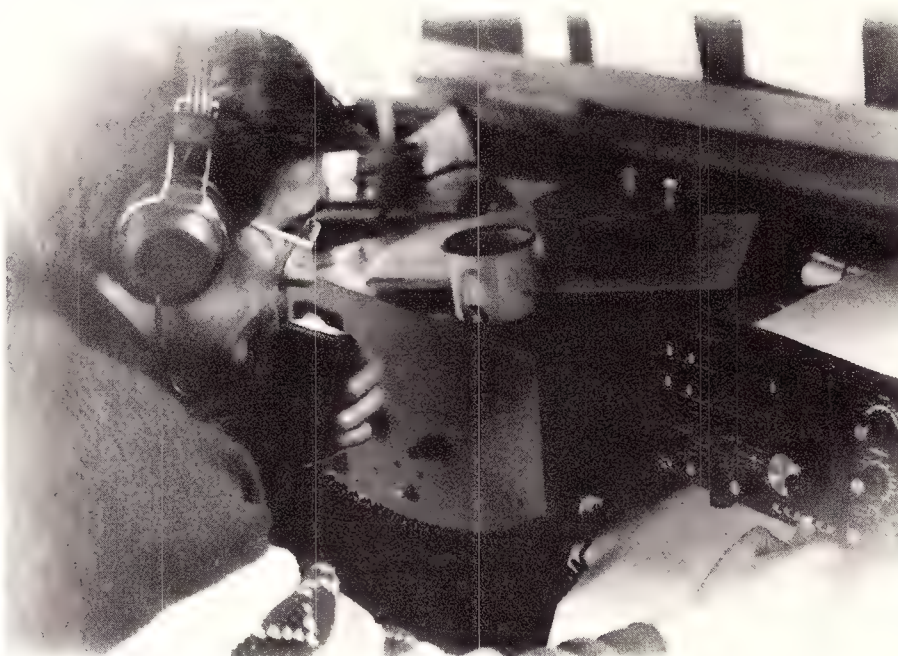
Amateurs on the scene "steered" those in other countries toward sending hand helds, Shulgin says. Their portable units were incapable of direct communication and "We had to resort to intermediaries, which also led to deplorable results."

Meanwhile, six packet stations sent to Moscow by ARRL were delayed in arriving in Armenia, and two Americans, members of the US-based International Amateur Radio Network, arrived in Moscow with equipment, only to be turned back by authorities who, according to UB5WE, "simply did not understand why Amateur Radio operators would be there to help."

Saving Lives

Soon after the earthquake, collective station UG7GWO in Yerevan, the Armenian capital, reported there was no communication with the areas affected by the quake.

Several amateurs from Yerevan set out for Spitak, site of the most grievous damage. Upon learning that the Republic



Yuri Katyutin, UA4LCQ, operates from Soviet Armenia. (photo courtesy UA4LCQ)

Inside Radio

If you have a soldering iron and a set of earphones in the Soviet Union or eastern Europe, you probably read *Radio* magazine.

On our way to USØSU last March,[†] *Radio*'s lab chief UZ3AU invited us to their Moscow offices. Editor-in-chief Anatolij Gorokhovskiy was surprised. Someone had forgotten to brief him on this first-ever event.

At a long table watched over by the ever-present portrait of Lenin, he sat with us for morning tea accompanied by huge bowls of cookies and orange slices. Deputy Editor Boris Stepanov, UW3AX, translated. Anatolij gave us a brief and routine history of the magazine as he sipped from a glass of tea held in his personal silver scone.

Ron Oates, a nuclear engineer from North Carolina, asked Gorokhovskiy if *Radio* planned to cover our expedition. "Well, yes, of course," he answered. Then he looked at me and said, "I will make you a business proposition." (I had been introduced as a journalist.)

"Will you write for us an article telling us about your expedition? Write it just as you see it from American eyes." To my photo vest he pinned a green pin with the word "Radio" in Russian letters, identifying me as the magazine's correspondent.

I began my job by asking a few questions. Women are found in Soviet mines, taxis, and sawmills, but I have yet to meet a female ham or hear one on the air. Deputy editor Stepanov explained that most radios are easy for women to operate, "but it would be almost impossible for them to build one."

I was there to listen, not to argue.

What have glasnost and perestroika meant to *Radio*? I asked. Because of what Gorokhovskiy calls "the new situation here and in the world," meetings like ours are now possible. Since glasnost, he added, the magazine has become "more willing to criticize the shortcomings of the industry. In previous years when we wanted to [criticize],

people said we shouldn't because maybe the Americans will understand it."

Although *Radio* receives part of its funding through the military, recently it has been critical of "our brass," Gorokhovskiy said. For example, he cited the drafting of Amateur Radio operators who were then assigned to nonelectronic fields.

Radio is published monthly in magazine format on cheap paper with very little color. Like most Soviet publications, funding comes from the government. The only product promotion is for Soviet electronic gear. While the quality of its photos might not impress American readers, its technical information has enabled thousands of Soviets to get on the air.

In the magazine's small laboratory, chief experimenter Gennady "Gene" Shulgin, UZ3AU, has developed two prototype transceivers that *Radio* markets as kits. American hams looking at the diagrams are surprised at the relative simplicity of the technology.

If market economics continue to reshape Soviet society, readers of *Radio* could one day be seeing ads for Japanese and American components.—Wallace Kaufman, KC4EBX

[†]W. Kaufman, "US-Soviet Radio Relations Thaw in the Arctic," *QST*, Oct 1989, pp 14-16.

[Editor's note: An editorial board of DOSAAF and Ministry of Communications officials dictates the makeup of *Radio*. While investigative reporting to uncover local bureaucrats not doing their job has long been a *Radio* trademark, only under Mikhail Gorbachev have the editors been unleashed to criticize both DOSAAF and the Ministry. Editor-in-chief Gorokhovskiy is chairman of the editorial board.

Although Amateur Radio makes up perhaps 20% of *Radio*'s content, both its deputy editor and laboratory director are hams. Gorokhovskiy is an electrical engineer but not a ham.]



Gene Shulgin, UZ3AU, talks with rescue workers. (photo courtesy UA4LCQ)

Sport Technical Club had prohibited UG7GWO from transmitting any information on the earthquake situation, they returned in despair to Yerevan.

"Not everyone shared this attitude (of some bureaucrats) toward amateur communication," UZ3AU wrote in *Radio*. "I learned that on the orders of the chief of the Central Radio Club, a group of radio amateurs had been organized to go to Armenia. The team was equipped to operate autonomously, was well equipped,

and would fly out in half an hour."

Shulgin, unable to join this team in time, got UW3AA and himself on a special flight to Yerevan. There, they went straight to UG7GWO, whose operators hadn't left the station for days. The participants in the unsuccessful trip to Spitak also were there.

UG7GWO's chief operator, UG6GAT, said the leaders of the Republic Sport Technical Club had turned down the idea of organizing an Amateur Radio net with the affected cities. This confirmed what

Shulgin had heard in Moscow.

Despite this, Shulgin and UW3AA set off for Leninakan, where they set up a 10-watt HF station.

After some initial problems, the word got around. Shulgin and Kostya, UW3AA, were visited by the Minister of Communication of Armenia, saying "There's an urgent need for communication with Yerevan!"

The pair contacted UG7GWO, whom the Minister told to send a telegram to Moscow.

"Why send a telegram via Yerevan?" the two amateurs asked. "We have a solid communication link with Moscow." After a demonstration, the Minister promised all possible assistance to the amateurs.

A Call to Arms

An editorial in *Radio* for June 1989 points out deficiencies in Amateur Radio's response to the earthquake and offers ideas for future improvements.

"While awaiting the establishment of a fast reaction organization on an all-Union (nationwide) basis, we could at least begin with what already exists and what has proven itself in Chernobyl, the snow avalanches in Georgia, and in Armenia.

"Let's equip the already self-organized volunteer groups of shortwavers from Moscow, Georgia, Armenia, Sverdlovsk, Novosibirsk, and the North Caucasus with



Bellevue, Washington firefighter John Ladd, N7HZG/UG6. (photo courtesy N7HZG)



UW9CW and UA9CJK supported Armenian earthquake relief efforts from their radio tent. (photo courtesy UA4LCQ)

equipment, tents, uniforms, and outfitting—with everything right down to orders and travel documents which take effect at the first report of a disaster.

“This proposal requires funding, as would of course the subsequent establishment of an all-Union fast reaction radio net; funding could in our view be provided without a great deal of effort by DOSAAF and its local committees, the more so since the net could be based on existing collective and individual stations.

The editorial concludes, “Time is pressing. There’s no warning of disasters. Often they can’t be avoided but they can and must be met in an organized manner.”

At the request of *Radio Magazine* Deputy Editor Boris Stepanov, UW3AX, ARRL in mid-September sent an extensive package of emergency communications related material to the Soviet Union.

[This story made possible by many people, including NT2X, K7ZR, KC4EBX, K7JA, K1MAN, W4ASX, and W4KM. I am grateful for their assistance. The photo on p 45 of October *QST* should have been credited to K7UDG.—K1TN.]

This DX-pedition was stopped by “Big Armenia Tragedy” 7th December 1988.

We are very sad about that.....

- ☐ UA6HPV/UG5G ☐ UV6HPV/UG5G ☐ UW6HWI/UG5G
☐ UA6HPR/UG5G ☐ UA6HRZ/UG5G ☐ _____/UG5G

To Radio _____

CMF QSO

DATE 19	UTC	2 WAY	BAND	RST
		CW-SSB	160-80-40-20-15-10	
		CW-SSB	160-80-40-20-15-10	
		CW-SSB	160-80-40-20-15-10	

This QSO is good for the award program of DTDXA & ZDXC

PSE/TNX QSL Via: ☐ JG1OUT or : ☐ UA6HPV
☐ JO1QUB

DTDXA % 2-18-14 Kojima, Taito-ku Tokyo 111 Japan.

P.O.BOX 999 Stavropol 335044 USSR

The Zilan DX Club had prepared the back of their QSL in anticipation of a joint expedition with members of the Western Washington DX Club (see Oct 1989 *QST*, p 45). The /UG5G space was for the visiting American operators.

Full Quieting from Space

Soviet Cosmonauts prove that line-of-sight is best

By Ed Kritsky, NT2X

PO Box 715

Brooklyn, NY 11230

and James D. Cain, K1TN

When Soviet cosmonaut Musa Manarov returned from 366 consecutive days in space last December, he brought back more than a world record for time aloft. He carried a ham radio logbook of more than a thousand contacts.

And the planning and preparation for his Amateur Radio operation hadn't even commenced until Manarov already had spent several months in space!

Not long after his return to Earth it was learned that Musa Manarov was to visit the United States. His tight schedule included a scientific conference in Washington and brief stops in New York City and Houston. He was unable to make an anticipated visit to ARRL Headquarters, but several New York and New Jersey radio amateurs were privileged to meet with him on May 18, 1989.

We learned that Musa, one of a new breed of cosmonauts with a civilian rather than military background, had no Amateur Radio experience before his historic flight aboard *Mir* (Peace), a permanent spacecraft with rotating crews. *Mir* would change that.

Spaced Out in Space

As far back as the mid-1970s, editors of the Soviet magazine *Radio* had raised the possibility of amateur operation by cosmonauts. But because of the brevity of space flights and the cosmonauts' heavy workload, nothing had come of the talk.

Soviet psychologists long had wrestled with the adverse effects long periods in space might have on their fliers. *Mir* cosmonauts used a two-way TV hookup to talk to their families twice a month, but this left them more homesick than ever.

As described in *Radio*, once the *Mir* crew, then consisting of Musa and Vladimir Titov, had become accustomed to their routines, Musa began to think back to radio and electronics, childhood interests in which *Radio* had played an important part.¹

So, at the end of March 1988 the *Radio* office received a telephone call from the cosmonaut-psychological support group at the Flight Control Center. Vladimir Titov and Musa Manarov (on their fifth month in space) had requested some fresh reading material—the latest issues of *Radio*.

Up the magazines went, in the next space truck (in May), along with a suggestion from the editors: How about a ham rig?

As they say, appetite comes with eating. Cosmonauts do have time off, and Musa in particular wanted to play radio. Soviet space authorities gave the go-ahead for operating on weekends, during recreation periods.

Top brass at *Radio* tell the story:

"To be frank, we doubted the possibility of realizing this operation. After all, in a very short period of time an appropriate transceiver would have to be found (there clearly was no time to build one), a special ultrashortwave antenna would have to be designed and built, and necessary instructions would have to be prepared.

"Time was short because the 'trucks' didn't go that often, and the antenna [which would be installed outside the orbiting station] would have to be delivered prior to the cosmonauts' excursion into open space.

"The transceiver problem was resolved relatively simply. Without any hesitation, well known Soviet shortwaver Valery Agabekov, UA6HZ, agreed to send off his

ultrashortwave transceiver from Essentuki, where he lives, to Moscow. [The 2-watt Yaesu hand-held and antenna were then ground tested for interference to the spacecraft's vital systems—Ed.]

"The instructions presented no particular problems—these consisted of the "Short-waver's Guide" and specially prepared instructions on transceiver operation and on amateur communication procedures.

"But the ultrashortwave antenna took some tinkering. It was a normal dowel rod, but... the peculiarities of putting it in place had to be considered [the cosmonauts work in spacesuits, which naturally restrict their ability to move around].

"The equipment was assembled and sent to the cosmodrome so fast that we didn't even have time to take photos for memory's sake. All we had were remnants of the dowel rod cut off in the process of tuning the antenna to the working frequency and also rough drafts of the instructions.

"Then a long wait—the package went to the cosmodrome, the equipment was sent to the spacecraft, and finally the long awaited call from the Flight Control Center: The antenna is installed."²

The antenna, fastened to the hull of the ship, served double duty by flying the Soviet flag.

Special calls were assigned to the cosmonauts—U1MIR to Titov; U2MIR to Musa; and U3MIR to Valery Polyakov.



Several New York and New Jersey hams had the pleasure of spending an evening with Soviet cosmonaut Musa Manarov, U2MIR, in New York City last May. (l-r) Allen, N2KW; Gene, N2AA; Musa, U2MIR; Marc, WA2S; Leo, WN2L. (NT2X photo)

¹Notes appear on p 52.

So that the cosmonauts could get used to the transceiver (by SWLing), the ground team first switched on several terrestrial beacons. Then UA6HZ and UK3KP went on the air, and a test contact with UK3KP (the collective station of *Komsomol'skaya Pravda*, the newspaper of the party youth organization) was made on November 8, confirming that the station was ready for operation.

On November 12 and 13, "lively discussions" on amateur operation took place between *Radio* employees and the cosmonauts on their service channel (off the amateur bands).

What Musa lacked in experience he made up for with enthusiasm and true pioneer spirit. He received his first coaching—on the air—from Boris Stepanov, UW3AX, deputy editor of *Radio*. Musa taped these sessions for later review.

The first lesson: How to conduct a QSO.

Their Novice Accents

But the students couldn't wait—earlier on November 12, during a break between classes when the spacecraft was out of direct line of sight of Moscow (and their teachers out of the classroom)—Musa and Titov had their first independent radio communication, a two-way with W4BIW, at an AMSAT symposium in Atlanta.

When operating began in earnest, Musa was at first distressed that no one seemed to hear him. His station had worked well during the initial test contacts. But the entire *Mir* operation had materialized so quickly that advance publicity was impossible. Among the first stations he called were two American amateurs—who took Musa for a pirate!

It so happened that around this time the author (NT2X) was talking to UA6HZ, who mentioned the DXpedition. He asked it be publicized, and *QRZ DX* (a DX newsletter) and ARRL HQ were notified. They broke the news.

Suddenly, Musa was lonely no more.

Musa's description of the experience of flying over populated areas, as hundreds (or perhaps thousands) of stations called him, is reminiscent of the experiences of US hams in the Space Shuttle. Over Japan his frequency buzzed like a hive of angry bees—not only were hundreds of JAs calling *Mir*, but Musa also was hearing ordinary QSOs between Japanese amateurs. (His frequency, 145.55, is a popular simplex calling frequency in Japan.) Talk about low-power DX!

U2MIR's signals were strong and easily copied on Earth. But Musa, a brand new ham, was getting his first taste of real DX pileups.

Europe wasn't much easier for him. It went like this: As the space station passed over West Africa, U2MIR could work such good DX as Senegal and the Ivory Coast



The cover of the January 1989 issue of *Radio* featured U2MIR in the space station.

with ease. Then, after a short intermission, they approached Europe—and wham! The frequency sounded like a new DXCC country had just come on the air.

The space station travels at eight kilometers per second, so Musa had eight minutes to work a given terrestrial station before moving out of range. Pleading with others not to call while a QSO was in progress didn't help much—as *Mir* moved, new stations that hadn't heard Musa's admonishments appeared, calling U2MIR.

The original plan for Musa to operate split hadn't worked out, so simplex was used; many QSOs went unfinished when stronger signals desensed Musa's receiver. Often, in passing over the US, the deep pileup nearly made operating impossible. Musa would maintain radio silence for a couple of passes, while some of the pileup went to bed.

"Once I nearly 'got a fever' from the exhaustion and stress of picking calls through the QRM," Musa recalled. Despite the problems, more than a thousand stations entered the *Mir* logbook.

As the year-long mission drew to a close, Musa began training his companions, U1MIR and U3MIR, in the art of ham radio. Both Vlad and Valery tried radio briefly before the crew rotated (at various times there were two, four—and at one point six—cosmonauts on board), but it was Musa who was the "born ham."

Musa's English is quite good, but he lacked practice at conversation—his Amateur Radio operating thus provided an unexpected benefit. And Musa laughingly told us he didn't know Russian ham phonetics, hampering his first contacts

back home. Nevertheless, U2MIR contacted Russian-speaking operators in Argentina, Brazil, and in South Africa.

One memorable QSO was with a South African ham of Russian descent who hadn't spoken a word of Russian for 50 years. Another ZS, unable to break in, yelled the only Russian words he knew: "Na zdorvye," then "glasnost" and "perestroika"—and made a contact.

In another QSO, a 70-year-old Soviet amateur operating from a club station said in a trembling voice that his hands were shaking with excitement. Musa was deeply touched.

Since their operations came at the close of the mission, hams around the world took the opportunity to wish the three cosmonauts a safe return to Earth. Typical of their sentiments was that of well known English satellite enthusiast Patrick Gowen, G3IOR (quoted in *Radio*):

"Your cosmonauts are performing wonderful work, helping medical, technical, and environmental research. And now contacts with the world radio amateur community have been added. They [the cosmonauts] are first class diplomats!"³

Since returning to Earth late last year, Musa Manarov's whirlwind schedule has left him little leisure time, but he has requested U2MIR for his personal call. He plans to be active on HF, and hopes to be part of a future *Mir* crew.

As for the *Radio* staff who made the *Mir* operations a reality, they are busy boosting Amateur Radio from space:

"Compared to [setting space records], Vladimir Titov's and Musa Manarov's operation on the amateur bands might seem insignificant. But of course it wasn't.

"First, the possibility of carrying on Amateur Radio communications is important for the psychological support of the cosmonauts, particularly for those who spend long periods in space.

"Second, the impression made on the millions-strong amateur community around the world was no less important. Shortwavers from the most remote corners of our planet contacted the cosmonauts. Stories about these contacts appeared in many newspapers in the USA, Australia, Argentina, and elsewhere."

For now, U3MIR continues to occasionally be heard from space, as do the call signs of his comrades Aleksandr Volkov, U4MIR, and Sergey Krikalev, U5MIR. QSL manager for *Mir* operations is UA6HZ.

The authors are grateful to Dexter Anderson, W4KM, for his translations to English of articles from *Radio* magazine.

Notes

¹*Radio*, Mar 1989.

²*Radio*, Apr 1989.

³See note 2.

ARRL Petitions FCC for Codeless Class of Amateur License

On August 31, 1989, ARRL submitted a petition to the FCC for a new "Communicator" class of Amateur Radio license which does not require a demonstration of proficiency in Morse code. The FCC has assigned the ARRL petition file number RM-6995.

Under the ARRL proposal, the new codeless license would require the applicant to pass a written examination somewhat more comprehensive than the present Technician class written examination, including some questions relating to Morse code, but without a Morse receiving, sending or recognition requirement. Three accredited volunteer examiners would administer the examination, and upgrading to a Technician class license would involve taking a 5 WPM code examination. Privileges would include all amateur frequencies and authorized modes above 220 MHz, with a maximum output power of 250 W. The licensee could not be a control operator of a repeater or auxiliary station. Call signs would be assigned from the Commission's "Group D" block.

The ARRL petition noted that the subject of an Amateur Radio license not requiring a demonstration of proficiency in the International Morse code has been debated with renewed vigor within the past year. Such debate has centered on how to attract to our ranks increasing numbers of people able to contribute to the development of Amateur Radio.

The League has not previously favored the creation of a codeless license class. It is the League's intention that new hams learn and use Morse code, and the proposed new license class would include questions about the code in the written exam. At its July 1989 meeting, however, the League's elected Board of Directors, by a vote of nine in favor to six opposed, voted to seek the creation of a new, codeless class of Amateur Radio license. The split vote of the League's Board reflects the controversy that surrounds this issue. Numerous amateur licensees expressed their opinions to various Board members. The Board also considered the recommendations of a special study committee, which had gathered information on the subject and rendered a comprehensive report. The Board adopted a more conservative proposal, relative to the privileges proposed. The changes reflected the input received from the amateur community.

Background

The concept of a codeless license has been around for quite some time. In 1974, in Docket 20282, the Commission considered the possibility of a codeless amateur license. In 1979, the FCC said it believed that a codeless, VHF-only license was necessary. Because four years had elapsed between the receipt of comments and consideration of the proposal,

however, the matter was left hanging. After March 1979, Docket 20282 was closed.

In 1978, the FCC considered the creation of a codeless license for handicapped persons (Docket 78-250). It was determined that handicapped amateurs generally did not desire special dispensation in the substance of amateur examinations. Rather, they merely asked that the examiners take into account their specific needs in procedural aspects of the exam.

In early 1983, the Commission again proposed a codeless class of license in Docket 83-28. The overwhelming rejection of the Commission's 1983 codeless license proposal by the Amateur Radio community must be viewed in its historical context, recognizing the circumstances prevailing at the time: a distrust of the Commission as the result of its WARC-79 surprise posture on Morse code requirements at HF; the inability of the amateur community to rely on the compromised FCC written examination as a substitute for the Morse code test; the novelty of the yet-untested volunteer examination program; and the perception that any volunteer examination program would be burdened in its infancy by the creation of yet another type of license. Each of these factors alone could have led to the unequivocal rejection by the Amateur Radio Service of the 1983 Commission proposal. The combination of circumstances caused rejection of any codeless license whatsoever, by an overwhelming ratio. The Commission terminated the proceeding without action in December 1983.

League's Study of a Codeless License Issue

The ARRL petition said that Novice Enhancement has been a great success in terms of reducing attrition and encouraging upgrading, but that it had not increased significantly the overall rate of influx of new Novices into the Amateur Service. Many amateurs have stated that there is a need for growth in the Amateur Radio Service, and a need to show to more people the benefits and opportunities of Amateur Radio. The success of the Novice Enhancement proceeding in retaining newcomers to the Amateur Radio Service leads one to consider the possibilities for attracting newcomers by creating a codeless license. While it is subject to serious debate whether the present five-word-per-minute code requirement is in fact a barrier to the entry of newcomers to Amateur Radio, there cannot be any doubt that the Morse code requirement is perceived as a barrier to entry among numerous nonamateurs. Many overcome that perception and become Novice licensees, but many do not.

The League, recognizing that the circumstances now prevailing are radically different than in 1983, and considering that a codeless license class is being actively debated again

among amateurs, convened a special study committee on the subject in December 1988, calling for a report by mid-1989. Foremost among its resource materials were the results of a survey conducted by the League of the experiences of other countries with codeless licenses.

The Committee sent a questionnaire to each IARU society which was known or believed to have a codeless license (in compliance with ITU regulations). The conclusions drawn from the study were interesting. Some countries showed little or no growth, despite such a license class being available. Essentially unanimous among those countries which reported negative experiences with codeless licenses was the sentiment that their written examination was inadequate or too simple to test qualifications. In such cases, the creation of the license class was typically the effort of the country's government, and was intended to accommodate CB-type service licensees.

On the other hand, in countries such as Australia, Federal Republic of Germany, and Belgium, where the written examination appears adequate to determine an operator's technical qualifications, the percentage of codeless licensees who upgrade to a traditional amateur license is extremely high; in some cases as high as 95%. The Amateur Radio societies of each of these countries report the presence of ongoing, active Morse code activities among codeless licensees who are working to upgrade their license class. One premise for the League's proposal is that similar programs will be sponsored for US codeless licensees. The concept can be a success in attracting newcomers, but an effort to create an incentive for these amateurs to upgrade their license class is necessary.

Four basic conclusions of the committee led to its acceptance by the League's Board that a codeless entry class license, with limited VHF and UHF privileges, should be created. These were (1) the perception that the code proficiency element of the amateur entry level examination is a significant barrier to entry and reduces the attractiveness of the Amateur Radio Service to certain technically-inclined persons who may be otherwise desirable and who might themselves benefit from it; (2) the code proficiency requirement does not act as the essence of an appropriate "filter" to weed out undesirables from the Amateur Radio Service; (3) there are many good reasons for maintaining a code proficiency requirement for any amateur license which confers HF communications privileges; and (4) there is nothing antiquated, nor irrelevant about the Morse code, nor its use in the Amateur Radio Service, but this is a matter that some individuals must learn for themselves, in order to appreciate that relevance.

The League's Board of Directors reviewed the committee's report. Individual Board

members had also surveyed the attitudes of amateurs in their divisions. Although there were regional differences in the results of those studies, it appeared overall that the attitude of amateurs was significantly more favorable toward a codeless amateur license than in 1983.

The Proposed Codeless License Class

The League proposes a new class of amateur license entitled "Communicator." The ARRL proposal noted that it is not, however, the same as or similar to the codeless license of the same name proposed by the Commission in 1974. It is not an "entry-level" license in the same sense as the Novice class license. The written examination will be reflective of the privileges to be earned, requiring a greater commitment than does the present Technician class written examination. The lessons learned from the codeless licenses of other countries necessitate a significant written examination.

The written examination proposed for the Communicator license would encompass Elements 2 and 3A of the present amateur examination structure; the latter upgraded with some additional questions related to the specific privileges afforded these licensees, and some questions concerning the Morse code. The new class of license would be administered by established Volunteer Examiners through the VEC program.

The ARRL petition went on to say that there should be an upgrade path from the Communicator class of license to the present Technician license by way of a five-word-per-minute Morse code examination, administered by the VEC program. This is self-explanatory, in that a Communicator has taken Element 2 and an expanded Element 3A in order to obtain his or her Communicator

license. Elements 2 and 3A together are the total written examination requirement for the Technician license. Thus, for a Communicator class licensee to take an Element 1A code test from an accredited VE would result in the passage of all elements of the Technician examination.

According to the petition, call signs for this new class of license should be assigned from Group D of the present call sign block for the Amateur Radio Service. This is most important, as the goal of the codeless amateur license is to bring such licensees into the "mainstream" of the Amateur Radio Service, and to encourage them to upgrade their license class. It is thus important not to "label" these licensees as distinct from other entry-level amateurs, or attach a stigma to the license class. Rather, the effort should be to assimilate them into the Amateur Radio Service by permitting them to interact with other classes of licensee in those bands in which Communicator licensees are permitted to operate. The League determined that the only acceptable balance of privileges is to afford such licensees unfettered operation above 220 MHz. With respect to power levels, the League, in the proposal, sees no need to permit the Communicator class licensees to operate at greater than 250 W PEP output, since greater power output can be reserved for higher-class licensees. This would create the incentive to upgrade. For the same reason, the League proposes to prohibit such licensees from being the control operator of a repeater or auxiliary station, though use of such would be permitted.

Conclusion

The ARRL believes new amateurs attracted to a codeless license will strengthen the

Amateur Radio Service. Those who have a true interest in becoming radio amateurs will have the opportunity to join, unfettered by unfounded preconceptions about entry barriers. They will not only have the opportunity to become amateurs, but will also have a more favorable exposure to the benefits of having a personal, cognitive communications skill, which is shared worldwide in the Amateur Radio Service. The learning of Morse code will be viewed more as an opportunity than as a burden, or a hurdle over which they must jump.

The ARRL petition concluded by saying that the creation of a codeless amateur license should be successful in the US, as it has been in other countries. The key ingredients seem to be a substantial written examination, significant incentives to upgrade, provisions for including codeless licensees in the on-air activities of other licensees and assimilating them into the mainstream of Amateur Radio. For its part, the League and the rest of the amateur community will have to create events and activities to provide such licensees a significant exposure to the benefits and utility of Morse code, so that Communicator licensees have an opportunity to learn and appreciate it.

In the petition, ARRL noted that this subject is not one which yet enjoys universal acceptance in the Amateur Radio community. It is, however, one which the League now supports as beneficial to the future, short and long term, of the Amateur Radio Service. The only way the plan can fail is if the Amateur Service rejects Communicator class licensees as full-fledged members. The League firmly believes this will not occur, as the Amateur Service has a tradition of mutual assistance, and guidance of newcomers by the more experienced members.

Congress Moves Ahead with \$30 License Fee Proposal

While many amateurs were using their licenses to provide emergency communications in the wake of Hurricane Hugo, a budget reconciliation bill containing a license fee proposal was introduced into the House as HR 3299 on September 20.

The Schedule of Charges is contained in Section 4701(a). The bill proposes to amend Section 8 of the Communications Act by

adding a new subsection including a \$30 fee for new licenses, modification of a license, renewal of a license, application for reciprocal permit and to obtain a Special Temporary Authority.

The House Rules Committee has permitted only five amendments to be offered on the floor of the House to this lengthy and

complex bill and it appears unlikely that there will be any opportunity for the House to amend or strike the fees. On the Senate side, a \$35 fee proposal was working its way toward floor action as a part of the Senate Commerce Committee's version of the budget reconciliation bill. See page 9 of this issue and check W1AW for late-breaking news.

ARRL OPPOSES BROADCASTERS IN PART 97 RECONSIDERATION PETITION

On July 20, a Petition for Reconsideration in PR Docket 88-139 (the new Part 97 rewrite) was jointly filed by the Radio Television News Directors Association (RTNDA); the National Association of Broadcasters; American Society of Newspaper Editors; CBS, Inc; Capital Cities/ABC, Inc; National Broadcasting Company, Inc; National Public Radio;

Post Newsweek Stations, Inc; and the Reporters Committee for Freedom of the Press.

In their petition, the broadcasters assert that the Commission's newly stated rule (97.113[c]) concerning instances in which Amateur Radio operators may convey information to broadcasters for dissemination to the public is confusing and overly restrictive. Their expectation, based on the FCC's Report and Order regarding the revised Part 97, was that the category of circumstances in which

Amateur Radio operators may furnish information to broadcasters was to be broadened.

In its Opposition filing on August 21, ARRL states that the "RTNDA [et al] misunderstands what the Commission's regulatory policy is with respect to news gathering using Amateur Radio facilities... 'News gathering was and still is prohibited absolutely. Amateurs' ability to convey information to broadcasters... is a narrow exception to the rules... It applies only in the most

limited of circumstances [and] cannot be broadened beyond the concept of emergency communications...lest the noncommercial nature of the Amateur Radio Service be subject to compromise, and the Service exploited."

DIVISION DIRECTOR ELECTIONS

The ARRL Election Committee has completed its examination of nominating petitions filed by members in seven Divisions for ARRL Director and Vice Director for two-year terms of office beginning January 1, 1990.

The following candidates are unopposed and were declared elected without balloting: Pacific Division Director—Rodney J. Stafford, KB6ZV; Southeastern Division Director—Frank M. Butler, W4RH; Great Lakes Division Vice Director—George E. Race, WB8BGY; Pacific Division Vice Director—Charles P. McConnell, W6DPD.

Ballots were ordered mailed to full members in six Divisions, as follows:

ATLANTIC DIVISION

For Director:

Hugh A. Turnbull, W3ABC
Robert B. Weinstock, KN1K

For Vice Director:

Kay C. Craigie, KC3LM
James M. Mozley, W2BCH

DAKOTA DIVISION

For Director:

Richard P. Clem, W0IS
George E. Frederickson, KC0T
Howard B. Mark, W0OZC

DELTA DIVISION

For Director:

Joel M. Harrison, WB5IGF
Arthur P. Kay, W5APX

For Vice Director:

James A. Amundson, W5TRD
Henry R. Leggette, WD4Q
John M. Wondergem, K5KR

GREAT LAKES DIVISION

For Director:

Leonard M. Nathanson, W8RC
Allan L. Severson, AB8P

MIDWEST DIVISION

For Director:

Paul Grauer, W0FIR
Robert S. McCaffrey, K0CY

For Vice Director:

Lyndell C. Miller, WA0KUH
Laurance S. Staples, W0AIB

SOUTHEASTERN DIVISION

For Vice Director:

Evelyn D. Gauzens, W4WYR
Alan H. Page, KE4WO

There is no candidate for Vice Director in the Dakota Division. In the six divisions where there are contests, ballots have been

mailed to all Full Members. Ballots must be returned by noon, November 20.

FCC RELEASES ERRATA LIST IN PART 97 REWRITE

On July 19, ARRL submitted a Request for Issuance of Errata List to the FCC in the Part 97 rewrite proceeding. It was submitted to "change the rules which were, in the League's opinion, unintentionally changed; where typographical errors were made; or where errors of omission appeared."

FCC responded with its Errata list released on September 7. After a review of the FCC's corrections list, ARRL Executive Vice President David Sumner, K1ZZ, said in a letter to the Directors, "This satisfies some, but not all, of the concerns expressed in our request for the issuance of errata."

Rick Palm, K1CE, editor of the newly rewritten *FCC Rule Book*, said the Errata will be included in the book's appendix.

PETITIONS FILED TO AMEND PART 97

On September 14, the FCC issued a Public Notice listing filings from ARRL and eleven other petitioners for amendment of the FCC's Part 97 Rules concerning the restructuring of licensing classes. ARRL, along with six other petitioners, filed for the creation of a code-free class of amateur license. Two petitioners filed for a change in code-speed requirements. Three others filed to restructure amateur operator licensing requirements and operating privileges. The ARRL petition was designated RM-6995.

Interested persons had 30 days (ending October 14, 1989) to file comments on these petitions with the FCC. The full text of these documents is available for viewing and copying in Room 239, 1919 M Street NW, Washington, DC, or may be purchased from the Commission's copy contractor, International Transcription Service (202-857-3800). Any FCC docket may be purchased from ITS.

FCC ENFORCEMENT ACTIONS

In conjunction with the San Francisco FCC Field Office, the US Attorney's Office in Fresno, California, has initiated a second criminal prosecution against Donnie Ray Johnson of Red Monkey Communications in Fresno for the alleged marketing of illegal Citizens Band (CB) radio equipment. In 1985, Mr Johnson was convicted for the same offense and was fined \$5000 and placed on two years probation. On August 14, 1989, engineers from the San Francisco Office, along with US Marshals, conducted a search and seized \$2000 worth of illegal CB linear amplifiers. The seized equipment was capable of operating in the CB band in excess of the power permitted by FCC rules.

Johnson's prosecution is part of a continuing enforcement program to assure that the FCC ban on manufacturing and selling CB linear amplifiers and other non-type-accepted transmitters is observed. Federal law (47 USC 302 (b)) prohibits the marketing and manufacture of such noncompliant electronic equipment. A second conviction for violation of

this law carries a maximum fine of \$100,000 and/or two years imprisonment.

In another action, US Marshals and investigators from the San Francisco Office of the FCC seized \$3000 worth of alleged illegal CB radio equipment from the residences of John Robinson of Sacramento, California, Andrew and Mary Lou Calloway of East Palo Alto, California, and Ted Green of Oakland, California. The CB equipment seized included two non-type-accepted transmitters capable of operating on frequencies not authorized for use in the Citizens Radio Service. Also seized were six CB linear amplifiers.

According to an FCC release, FCC engineers from the San Francisco Office investigated and identified the locations of the three operators after receiving many complaints of interference to TV and radio reception from their neighbors. Robinson, Calloway and Green reportedly refused to permit FCC personnel to inspect their CB radio stations. FCC Rules (47 CFR 95.426) require that all CB radio stations be made available for inspection upon request of an authorized FCC official.

Warning letters and fines were issued for failure to permit inspection of their stations. All three operators refused to pay the civil penalties. FCC officials and the US attorney agreed that the seizure of the equipment was necessary to achieve compliance with US radio laws. In total, \$3200 in fines were issued to Robinson, Calloway and Green.

FEMA EMERGENCY PREPAREDNESS GUIDE AVAILABLE

Millions of Americans Have Experienced Disaster—Are You Prepared? is the title of a publication offered by the Federal Emergency Management Agency (FEMA). This 18-page booklet reviews Civil Defense organizations in the country, how they work in times of natural and man-made disasters, and heightens public awareness of the value of such organizations. At the end of the brochure is a list of other FEMA publications.

FEMA is responsible for a wide range of emergency planning and response activities. It works with state and local governments and national organizations to help communities plan for emergencies of all types.

...*Are you Prepared?* and other FEMA publications may be obtained free by writing to: FEMA, PO Box 70274, Washington, DC, 20024.

PART 97 RULES COVERING INTERNATIONAL RADIO COMMUNICATIONS

The FCC has issued a Public Notice concerning communication with amateurs in foreign countries. The following subjects have been addressed:

Permissible countries: Section 97.111 states when the administration of a country objects to its amateurs contacting US hams, it becomes a "banned country." Currently there are no banned countries.

Prohibited transmissions: Section 97.113 says that communications for the purpose of facilitating the business or commercial affairs

of any party is prohibited. Use of amateur communications as an alternative to broadcast, common carrier, maritime, land mobile or other authorized radio services is also prohibited.

Third-party arrangements: Section 97.115 "...authorizes an amateur station licensed by the FCC to transmit messages for a third party to any amateur station within the jurisdiction of a foreign government whose administration has made arrangements with the United States to allow amateur stations to be used for transmitting international communications on behalf of third parties."

Countries that have made the necessary arrangements with the US to permit third-party messages are: Antigua and Barbuda, Argentina, Australia, Belize, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, The Gambia, Ghana, Grenada, Guatemala, Guyana, Haiti, Honduras, Israel, Jamaica, Jordan, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, St Christopher and Nevis, St. Lucia, St Vincent and the Grenadines, Sierra Leone, Swaziland, Trinidad and Tobago, United Kingdom (special event stations with call sign prefix GB followed by a number other than 3), Uruguay, and Venezuela.

United Nations stations 4U1ITU in Geneva, Switzerland, and 4U1VIC in Vienna, Austria, have also made arrangements with the US to permit third-party communications.

FOREST SERVICE FINALIZES FEES FOR COMMUNICATIONS SITES

Over the past two years, *QST* has reported on the proposed rental fee schedules for various radio and television services, including Amateur Radio, which rent US Forest Service land for communications sites in six of nine Forest Service Regions. Originally, the Forest Service proposed fees ranging from \$300-\$1200 for amateur repeaters. ARRL and individual amateurs submitted comments urging little or no fees. Later proposals suggested a \$75 nonwaivable yearly fee for amateur repeaters.

According to the August 23, 1989 *Federal Register*, the Forest Service has now finalized its fee schedule for communications uses. The fee for amateur repeater sites in the six affected Regions has been set at \$75. According to the notice, the \$75 fee offsets the Service's administrative costs, and will not be reduced. The Forest Service Regions are: Intermountain (Nevada, Utah and parts of California, Idaho and Wyoming), Northern (Montana, North Dakota, and parts of South Dakota and Idaho), Rocky Mountain (Colorado, Kansas, Nebraska, South Dakota and Wyoming), Pacific Southwest (California), Southern (Alabama, Arkansas, Florida, Georgia, North Carolina, South Carolina, Tennessee, Virginia, Kentucky, Louisiana, Mississippi, Texas and Puerto Rico), and Southwest (Arizona and New Mexico.) The effective date for the changes was September 22, 1989.

FCC-ISSUED CALL SIGNS UPDATE

The following is a list of the FCC's most recently issued call signs as of September 1.

District	Group "A" Extra	Group "B" Advanced	Group "C" Tech/Gen	Group "D" Novice
0	WW0G	KF0EV	N0KZG	KB0FDO
1	NY1M	KC1QF	N1GXH	KA1UJF
2	WS2R	KE2PD	N2JVZ	KB2IND
3	NW3C	KD3OS	N3HLK	KA3VCY
4	AB4QF	KM4XI	N4WTV	KC4MFK
5	AA5NR	KG5XY	N5PDG	KB5KMF
6	AA6QE	KJ6ZE	N6WET	KC6FOP
7	AA7BR	KF7WI	N7NLL	KB7IOC
8	WU8Z	KF8BE	N8LGA	KB8IBG
9	WK9E	KE9SB	N9IVP	KB9DIU
Guam	KH2K	AH2CF	KH2ED	WH2AMH
Hawaii	**	AH6JV	NH6UK	WH6CFB
Alaska	**	AL7LM	NL7SO	WL7BVN
USVI	NP2F	KP2BQ	NP2DI	WP2AGY
Puerto Rico	**	KP4QH	WP4WR	WP4INE

**indicates that all 2 x 1 calls have been issued in those areas.

NTIA TO STUDY USE OF RF SPECTRUM

The National Telecommunications and Information Administration (NTIA) says that "Commencing this fall...[we]...will undertake a comprehensive policy review of the use and management of radio spectrum in the United States." This marks the beginning of the first fundamental reexamination of spectrum policy objectives and issues since NTIA's organization in 1978.

NTIA indicates that the review is timely in light of ever-increasing demands for frequency allocations. These demands will cause changes requiring the development and fostering of policies that will encourage the most effective, efficient and fair use of available frequencies.

In the near future, NTIA intends to issue a Notice of Inquiry (NOI) to request public comment on specific economic, technical, and regulatory issues concerning US spectrum policy.

The NTIA is the executive branch agency principally responsible for the development and presentation of domestic and international telecommunications policy. NTIA acts as principal adviser to the president on telecommunication policy, and is directed to develop a long-range US spectrum management plan. The agency also has statutory authority to license government radio frequency use.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Eastern New York, Eastern Pennsylvania, San Diego, South Dakota, Louisiana, North Carolina, Virginia, and Pacific sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

A petition, to be valid, must contain the signatures of five or more Full ARRL members residing in the Section concerned. Photo-

copied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. It is advisable to have a few more than five signatures on each petition.

Petition forms (FSD-129) are available on request from ARRL Headquarters but are not required. The following is suggested:

(Place and date)

Field Services Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned Full members of the...ARRL Section of the...Division, hereby nominate...as candidate for Section Manager for this Section for the next two-year term of office.

(Signature...Call...City...ZIP).

Any candidate for the office of Section Manager must be a resident of the Section, a licensed amateur of Technician class or higher, and a Full member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination.

Petitions must be received at Headquarters on or before 4:00 PM Eastern Standard Time December 8, 1989. Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before January 2, 1990. Returns will be counted February 20, 1990. SMs elected as a result of the above procedure will take office April 1, 1990.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two-year term beginning January 1, 1990.

If no petitions are received for a Section by the specified closing date, such Section will be resolicited in April 1990 *QST*. An SM elected through resolicitation will serve a term of 18 months. Vacancies in any SM office between elections are filled by the Field Services Manager.

You are urged to take the initiative and file a nomination petition immediately. For more information, contact Richard K. Palm, K1CE, Field Services Manager, ARRL HQ.



• At the Foundation

DXing the Foundation

Here's an example of how a specialized Amateur Radio interest can help broaden the educational opportunities for our fellow hams.

By Mary E. Schetgen, N7IAL
Secretary
The ARRL Foundation, Inc

For many people, travel affords a wonderful chance to see, hear and experience the variety of cultures and lifestyles in places different from their own day-to-day environments. For hams who enjoy DX, every QSO offers the vicarious thrill of travel, while never leaving the comfort of the shack easy chair. Hams who have the time and resources to travel often heighten DX enjoyment for all us through their voluntary operations during DXpeditions. Our geographic knowledge increases, we learn more about our greater *international* Amateur Radio community, and in turn, become better informed *world* citizens.

A few DXers have become some of the best remembered and well-loved hams in the international world of Amateur Radio. Some have achieved an almost legendary status for their DX activities, and their stories have graced the pages of ham publications for many years. Two such special hams, Donald Riebhoff, K7ZZ, and Bill Bennett, W7PHO, both Silent Keys, became legends even beyond the DX community. Their contributions to our hobby were different (see Nov 88 *QST* p 47) but important to international appreciation for the friend-making potential of Amateur Radio. Friends of K7ZZ and W7PHO understood the importance of keeping the goals of these dedicated DXers alive and established Foundation scholarship funds in memory of each man, respectively. These scholarship funds are to provide scholarship awards to hams involved in an international studies curriculum.

When each of our funds reaches the \$10,000 mark, scholarship awards will be made to deserving students. We'll be publishing the scholarships' "Terms of Reference(s)," so you'll know what you need when applying for these scholarships. Fund balances for each of these scholarships, as of June 30, 1989:

Donald Riebhoff, K7ZZ Memorial
Scholarship Fund—\$7,145
Bill Bennett, W7PHO Memorial
Scholarship Fund—\$1,588

Your support of these two scholarships will help us reach our goal of making scholarship awards in the upcoming 1990-91 academic season. If you agree that our hobby offers unique opportunities for greater understanding between communities and nations and want to help our fellow ham-students who are involved in international studies, designate a contribution to the fund of your choice and mail today to: The ARRL Foundation, 225 Main Street, Newington, CT 06111.

THE MERITORIOUS MEMBERSHIP: GIVE A HAM A HAPPIER HOLIDAY

What is a Meritorious Membership? Who receives one? How can I help? The Jesse

Bieberman Meritorious Membership Fund is intended to provide for a one-year membership extension for individuals meeting the following criteria: (1) US ARRL membership of 25 years or more; (2) 65 years of age or older; and (3) elderly and/or disabled with a known financial need. Recommendations for Meritorious Membership are made by Division Directors, only. If you know of an individual meeting the above criteria, make a recommendation, in writing, to your Division Director (see listing on p 8 of this issue). And remember: Your contribution to the Meritorious Membership Fund will help assure that longtime ARRL members who may no longer be able to afford membership receive a much appreciated extension. Naturally, we keep our Meritorious Membership recipients confidential, to ensure their privacy.

Contributor's Corner

We wish to thank the following for their generous contributions to:

The Victor C. Clark Youth Incentive Program Fund

Tri-City Amateur Radio Club (CT)
in memory of Stanley Lamb,
W1WHQ and, A. William Welles,
W1KYW

The New England FEMARA Scholarship Fund

Tri-City Amateur Radio Club (CT)
in memory of Stanley Lamb,
W1WHQ and, A. William Welles,
W1KYW

The General Fund

Frank F. Bateman, N4HRP
Orven D. Hillman
J. F. Meyer, W6ZKF
in memory of Everett Oliver, K9ZHZ
Kenneth C. Hopper, N9VV
Major Wm R. Chaires, K4MSJ
Charles E. Debes, KA5WVH
James M. Pulliam

Virgasun A. Sordillia, Sr, KH6BBC
Walter P. Krueger, W9CTR
Gordon W. Bridwell, K4NGT
Joseph R. Vicich, W9OPI
William B. Thompson, N5KLG
James N. Pruitt, WD4LSS
Charles Timothy Via, WB4SVL
William E. Brosious, WA2HOJ
J. R. Goldthwaite
Sidney T. Smith, W4MV
Paul L. Park, K5OTM
Morley Genuth, NH6NG
Lawrence E. Small, K6GZM
Robert W. Carlsen, K4ALZ
Martin F. Baade, K2LKL
David D. Robb, W0YRN
Chester T. Rice, WA6PAC
Navarro Amateur Radio Club (TX)
in memory of Dan Moffett, N5MOR
Anthony J. Sarli, Jr, N9GLY
Carlton R. Lindell, W8MNG
R. A. Wetzell, W8KNT
As received and acknowledged during
the month of August.

QST



THE ARRL FOUNDATION, INC.

"for the advancement of amateur radio"

RSGB 144-MHz Contest Inspires YL

By Diane Jennings, G1YMF

1 Somerville Close,
Little Neston, South Wirral,
Cheshire, L64 0ST United Kingdom

My first contact with Amateur Radio occurred when I overheard Chris, now my fiancé, talking of his latest ascent of Black Coombe in England's Lake District to take part in something called "an Amateur Radio contest."

This discussion took place many times in the student union bar of Coventry Polytechnic, and I was soon to discover what these events consisted of—no problem, I thought, if he can do it, then why can't I?

Chris and I became good friends, and as I was also very keen on walking, I decided to prove to myself (and others) that women are just as capable of taking part in a physical challenge as men.

We decided that I would climb Black Coombe with Chris and make the food and the endless cups of coffee that he would consume in the course of the 24-hour, single-operator section of the RSGB 144 MHz September Trophy contest. The weekend was to start with a hectic car journey from Coventry to our accommodation in South Lakeland.

We arrived at Chris's parents' cottage at about 2200 that Friday evening. I was ready for an early night after the tiring journey, but found it rather difficult to sleep as Chris was moving around the cottage until the early hours messing with radios, microphones, batteries, sleeping bags, and countless bits of aluminum mast and aerial pieces.

Ding, ding, ding. The alarm sounded on that Saturday morning and I peered with my eyes virtually closed at the clock—0600. I climbed out of bed and was surprised to find Chris was still preparing for the contest.

After breakfast we began packing the rucksacks. The contest site was to be reached on foot, and I therefore didn't have the comfort of knowing that all this equipment lying before me could be taken to the site by a vehicle. We left the warmth of the cottage at 0830 and proceeded to the bottom of the mountain.

"It's only 2000 feet," I heard Chris say many times, and I didn't think it too bad until I saw the sky turn pitch black and the rain start to pour down as I had seen it do countless times before in that part of the country.

We had divided out the kit, and luckily I had only about 15 pounds to carry. We started the ascent at 0930. I couldn't understand why Chris was in such a hurry to reach the top, since the event wasn't due



Christopher Partington, G0CLP, and Diane Jennings, G1YMF, stand next to their site during the RSGB's 1988 144-MHz September Trophy Contest on Black Coombe in England's Lake District.



Diane Jennings, G1YMF, received her license after she had a first-hand experience with VHF contesting.

to start until 1400.

Just over an hour later we arrived at the windy, misty summit. Quickly we began to pitch the ridge tent that was to be our home for the next 27 hours. I soon realized why we had started the day so early. Next came the struggle with the 8-element Yagi. This took some time to anchor down on the 16-foot portable mast in the strong wind. After it was up, I began to wonder how long it would remain on the weather-beaten summit. At last we could retire to our shelter.


Wrapped in down coats, Chris set up all the radio gear and I arranged a "kitchen" for myself. I made a well-needed pot of coffee, and Chris began to check the gear by sending out a series of CQs. It sounded so very strange, shouting out in the mid-

dle of nowhere. Then I heard a voice on the other end. It was very clear, and Chris said the signal was 59. After we knew the gear was working, it was time for a coffee break before the contest started.

The 1400 alarm sounded and Chris eagerly picked up his microphone and called CQ. I knew I would not be able to talk to him for the next 12 hours at least. Time passed quickly at first as contacts rolled in. I was sent outside a number of times to check the tent. The sides flapped merrily in the wind.

After the first few hours the number of contacts calmed down a bit, as I suspected people were sitting at home in their centrally heated rooms, drinking a nice cup of tea. Tea for us consisted of soup followed by tinned sausage and beans, which were easy to heat up.

It soon fell dark, and the contest entered another phase. Gas lanterns were lit for heat as well as light, and I crawled into a sleeping bag. As contacts were only coming at the rate of three or four an hour, Chris decided he would close down the station at 0230. The radio gear was moved to one side for a few hours, the lamp put off and we snuggled down in sleeping bags to grab some sleep. A few hours later the alarm rang—another 0600 start. Chris dived to the rig, and began calling CQ for another eight hours.

I thoroughly enjoyed my introduction to Amateur Radio. From the enthusiasm and determination Chris had shown in the contest, I was inspired to study for the City and Guilds exam the following May. In August 1987 I became a radio amateur and have survived several multioperator contests as part of a one-man, one-woman team. 

How's DX?

Conducted By Ellen White, W1YL/4
19620 SW 234 St, Homestead, FL 33031

CQ de RZ6AWL/UF60

With the idea in mind for a joint US-USSR DXpedition to UF6 (summer of 1990), a group of Armavir City hams decided to go through a dry run. They chose the mountains of the South Ossetia, in the rare oblast UF60, 015. The team included RW6AC, UW6CD, RA6AJ, UV6AMT, UW6DR's XYL and several offspring.

On June 30 they began the 1200 km trip along the Black Sea coast to the mountains, through beautiful subtropical scenery, ancient castles, churches and cathedrals. The chosen site was a large meadow on the edge of the woods at 4000 feet above sea level. An abandoned house with commercial power made a convenient shack. One transceiver failed to operate, so the station was limited to one rig and a linear amplifier.

Propagation on the mountain was different from that in the valley, with 80 and 40 meters dead most of the time. While their signals were reported to be strong in Europe, the group did not hear EU signals at all, except for a couple of big guns! Even local contacts were marginal. They made just 100 contacts on 80 and 300 on 40. On



Jack, RW6AC, was chief of the RZ6AWL/UF60 DXpedition.

the other hand, 20 and 15 meters were great: Contacts totaled 4500, including 2000 with the US.

The group could have worked more, but their camp attracted the intense curiosity of residents of nearby Georgian villages. The inhabitants were friendly and hospitable, but they knew nothing about ham radio and couldn't understand why the team kept one guy "stuck" to the radio! When the locals found out the group may come back next year with Americans, they gave assurances that all would be welcomed. On July 5, storms approached and the decision was reached to leave while the roads were still passable.

Those who worked RZ6AWL/UF60 twice (on two bands or on two modes on one band) can get the Armavir—150 Years Award. Apply with 10 IRCs to Jack Tatashvili, RW6AC, Box 16, Armavir 352900, USSR. If you make three contacts with different Armavir hams, you can qualify for the jubilee award. (If you'd like to join this international field day operation next year, write Jack for details.—Ed.)

CIRCUIT

□ **The Ten Biggest DX Lies:** (1) I didn't need it. (2) I got him on the first call. (3) I worked him before. (4) The card is in the mail. (5) He answered my CQ. (6) I'll call you just as soon as he comes on. (7) Two more and I make the Honor Roll. (8) He QSLed direct. (9) Sure, I've got them all. I just don't bother to turn the cards in. (10) I'm a DXer and my wife just loves it. (Thanks to K7NG's XYL for the suggestion, and recent enthusiastic convention participation in this weighty discussion, which included ARRL directors W7RM and AGØX!)

□ **Events:** The New England DXCC Convention and Dinner, Saturday November 18, starting at 1 PM at the Sheraton-Sturbridge Hotel, Sturbridge, Massachusetts. Last-minute info from Fred Lucas, K1EFI, tel 203-775-1896. The 1990 International DX Convention in Visalia, California, will be hosted by the Southern California DX Club at the Visalia Holiday Inn, April 6-8. Don't wait to reserve your room. Call toll free inside CA, 800-821-1127; outside CA, 800-348-8877.

□ **Bouvet:** At column deadline, LA6VM reports that 90 DXers in 14 countries have contributed toward a charter ship with helicopter to go to Bouvet.

□ **W4BPD:** The venerable Gus Browning, veteran of 170 or so DXpeditions, has suffered three heart attacks and is in grave financial straits. Cards to Gus' *Callbook* address.

□ **IOTA:** Nov 11-12, the Florida Westcoast DX Ring will operate KO4J from Egmont Key, just west of Tampa Bay in the Gulf of Mexico 82-46W, 27-35N, IOTA Island NA-34.

□ **C6:** N4JQQ, KR8V and W8LU will be in the Bahamas Dec 7-11. They'll use C6AFP during the ARRL 10-Meter Contest only, cards via

KR8V with SASE. Other confirmations go via individual home calls.

□ **HS:** Significant 1990 Thailand activity by individuals is anticipated now that the country's King holds HS1A (the club HSØA is now HSØAIT).

□ **HL:** The American Radio Club of Korea has old cards just released by the post office. If you were an American HL9 during the past 10 years, send an SASE to the Club, PO Box 153, APO San Francisco, CA 96206. Include the HL9 call and dates it was valid.

□ **XT2CW:** Globe trotting DK7PE worked 6500 QSOs on all bands in August after receiving a

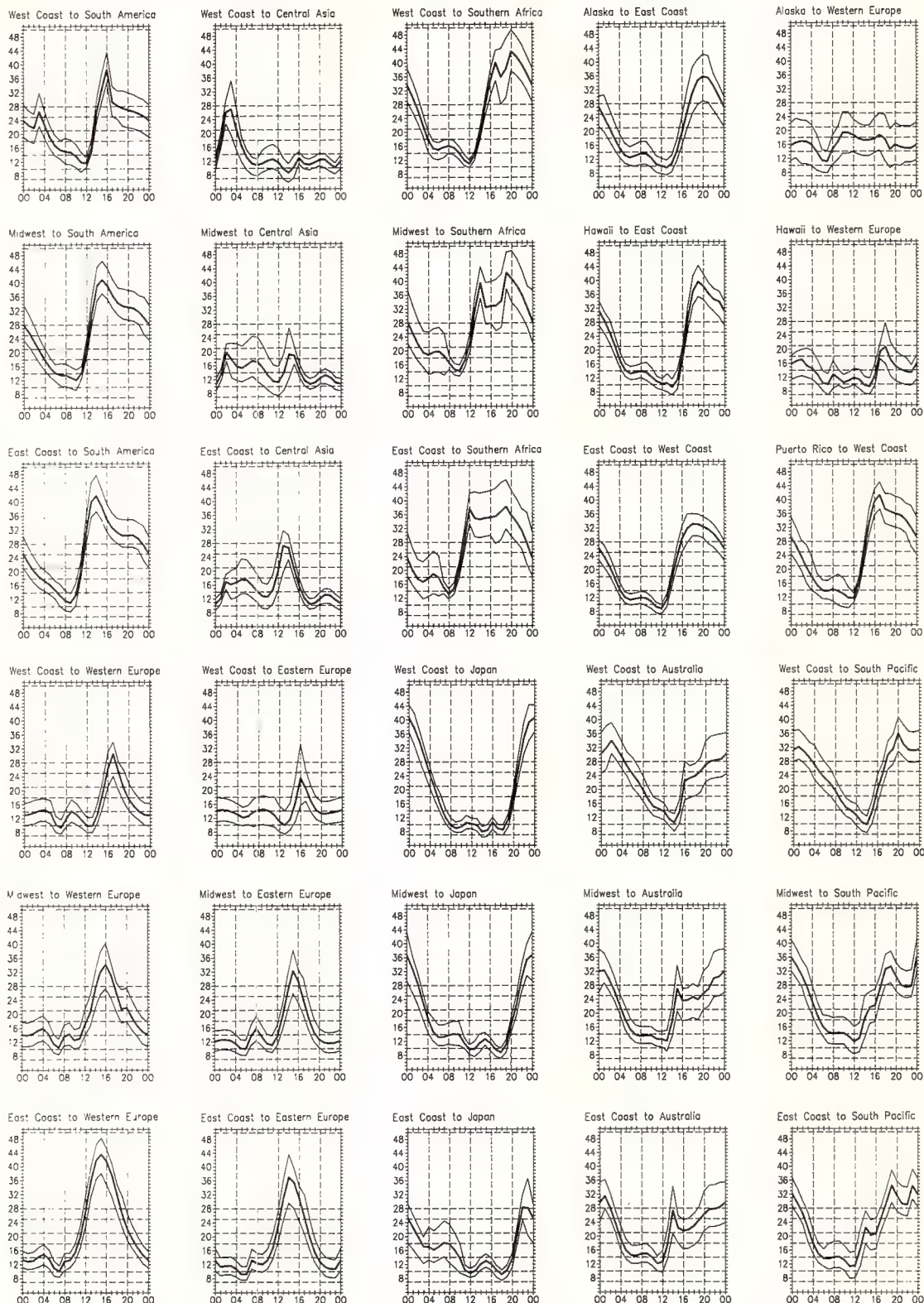
personally signed license from the Burkina Faso PTT Minister. Rudi notes that one of his most interesting contacts was with N9US who was running 1 W on 160 meters!

□ **RSGB:** The new address for cards from overseas to the UK QSL Bureau is PO Box 1773, Pottery Bar, EN6 3EP, England.

□ **YASME:** The YASME Foundation, Box 2025 Castro Valley, CA 94546, has received numerous old logs from the wife of the late KV4AA: 1956—VR1B VR4AA VK9TW. 1958—VP2AY VP2KF VP2KFA VP2VB VP2MX VP2DW VP4DW YVØAB. 1959—VP2LW VP2GDW VP2SW VP7VB. 1960—VP5VB HC2VB HKØAA. (Thanks RSGB's *DX News Sheet*.)



In a March 1988 trip to the Soviet Union, KA1HBV visited these two Russian hams who hoped to visit the US at year-end. Toivo, RA3AR (r) is chief operator of the Moscow Intersectoral Scientific/Technical Eye Microsurgery Complex Club Station, UZ3AZZ. He is a former Aeroflot pilot, and holds the title of Master of Sport—a busy QSL manager who handles cards for the Antarctic stations 4K1A, 4K1HK, 4K1ANO. He also manages UAØZDA in Kamchatka. Natasha, RA3AP, is an engineer and active on all CW bands. QSL via Toivo Laimitainen, Box 459, 127349, Moscow, USSR. (photos courtesy KA1HBV)



When are the bands open? These charts predict this month's average propagation predictions for high-frequency circuits between the US and various overseas points. One chart showing East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or HPF). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or MUF). On 90 percent of the days of the month, it will be at least as high as the lowest curve (optimum traffic frequency, or OTF). The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. See April 1983 QST, pp 63-64, for a more-detailed explanation. The 3rd edition of *The ARRL Operating Manual* contains similar charts for a range of sunspot numbers and times of the year. Sunspot data is derived from *Solar Indices Bulletin*, National Geophysical Data Center smoothed (E/GC2), Boulder, Colorado. Curves are generated using IONCAP. These predictions, for November 16 to December 15, 1989, assume a smoothed sunspot number of 190, which corresponds to a smoothed 2800-MHz solar flux of 234.

QST

Correspondence

Conducted By John C. Hennessee, KJ4KB
Regulatory Information Editor

All letters will be considered carefully. We reserve the right to shorten letters selected in order to have more members' views represented. The publishers of *QST* assume no responsibility for statements made herein by correspondents.

EXCELLENT ADVICE

□ Just read N4LBJ's letter in the September issue of *QST* entitled "Switch to Safety" and in no way could I more closely identify with him. It brought to mind a similar experience in 1938 shortly after my coveted ticket arrived.

At 17, I was servicing (poking around) a power supply I had just built. The output filter was a bargain-type cocoa box unit with two porcelain insulators. As I lifted the lug from the positive terminal, a spark as thick as a pencil and a half-inch long suddenly hissed menacingly at me. After regaining only partial composure, it became obvious that not only was the line cord plugged in, but the B+ toggle was on. After discharging it with a long screwdriver, a VOM was attached and the line cord plugged in. After waiting for the rectifier to heat, the B+ toggle was thrown with a piece of wood. The meter read 960 volts dc.

Only by the grace of God did my body not contact ground when unloosening the nut on the positive terminal!—*Dick Abeles, W2LMR, Hicksville, New York*

10-METER CALLING FREQUENCY

□ September *QST* had two letters of interest to me. [With regard to] Chuck Albecht's letter, I sure wished the editor had put in a comment about not dropping down [from the 10-meter repeater subband] to the 29.3-29.5 MHz segment which is reserved for satellite operations! We [at AMSAT] are still getting comments from our satellite users about the QRM from FM stations.

[With regard to the letter from] Pete Gerardi, KE4TP [concerning] "SSTV and The Gentlemen's Agreement," there is also a calling frequency for mode B satellite operation using SSTV, namely, 145.888 MHz.—*John Champa, K8OCL, AMSAT, Dearborn, Michigan.*

DIAMOND JUBILEE AWARD: IN CELEBRATION OF ARRL

□ The stool has three legs now that I have worked 75 countries on the 18- and 24-MHz bands. Back in January, I submitted my application for the League's Diamond Jubilee Award after working 75 ARRL/CRRL Sections and 75 Novice/Technician stations. These accomplishments put the first two legs on the tripod for my Diamond Jubilee Award. Now the third leg has been earned, as I worked 4X4OG in Israel on 18 MHz for my 75th country on the 18 and 24-MHz bands. This well thought out League program has clearly been a great stimulus for the Amateur Radio community in bringing attention to these wonderful WARC bands, and it has brought the League's 75th anniversary

to the attention of Amateur Radio operators and others throughout the world. My experience in discovering these new bands as a direct result of the League's Diamond Jubilee program has been an unexpected pleasure. Much of my operating in prior years has been on the congested traditional bands of 14, 21 and 28 MHz. Operating on these new bands has been a delightful experience.—*Kenneth Miller, K6IR, Rockville, Maryland*

BRAVO, QST

□ I wish to compliment ARRL on the current format of *QST*. It used to be rather dull reading in years past, but no more! The September 1989 issue was quite a marvel, especially the "Tales of Triumph" in the Novice Notes section. This is what Amateur Radio needs more than anything else: *human interest* stories, lively written with the ring of truth in them.—*Dr F. Paul Kosbab, NF4E, Tulsa, Oklahoma*

SUPPORT NEW AMATEURS

□ A codeless license would let the public know that we are surely on the cutting edge of communications technology with the digital modes enabling the networking of computer systems worldwide through radio. Right now, my impression is that many nonhams see our service as an "old man's hobby" of the pre-World War II era. As a result, they (especially teenagers and young adults) shy away. We should concentrate our energies not only in terms of the sheer variety of what today's Amateur Radio has to offer the prospective licensees, but also emphasize that it's *everyone's* hobby, the only initial prerequisite being an interest in radio communications.

I would like to emphasize how proud I am to be an Amateur Radio operator and a member of ARRL. Through the hobby, I have made several close friends, engaged in public-service work and have had hours of fun operating and making contacts all over the world. Without the unselfish support of hams, it would not have been the pleasure it has been to be a member of the fraternity. If we desire to continue our proud tradition, let us make the necessary positive changes. Let us show each and every prospective licensee that we, the worldwide amateur fraternity, appreciate their interest, and we will give them all the guidance and encouragement we received from our Elmers. I pray that, through the conscientious effort of every one of us, Amateur Radio will remain a strong worldwide service, and hopefully we will become even stronger as years pass.—*L. S. "Steve" Williams, KC4AZO, Snellville, Georgia*

AMATEUR RADIO IN CHINA

□ I noticed with some interest the article entitled "Squelch Tails from China's Great Wall" in September *QST*. There seems to be some question as to the status of Amateur Radio since the events of June 1989 in Beijing. I was recently in Beijing and visited with Tong Xiao-Yong, Director of BY1PK.

There was reportedly no violence near BY1PK in the June incident. Everything in Beijing seems to be back in order, but people seem to be more careful as to whom they talk with and what they say. I find the people of Beijing to be generally warm and friendly.

Mr Tong reports that there are now over 300 licensed hams in China. Chinese salaries (on the average) are very low and import duties high, so it is not likely that we will see many big stations that are privately owned. Mr Tong also indicated that because of various other duties at the Chinese Radio Sports Association (CRSA), it may take up to one year to respond to QSLs.—*Scott Irvin Brear, VS6WS/KG6QT, Lantau Island, Hong Kong*

HURRICANE HUGO

□ I recently had a chance to listen to the various nets that were in operation during the Hurricane Hugo disaster. What I heard made me proud to be a ham and, at the same time, made me feel ashamed. Some individuals, rather than standing by to help if needed, jammed the nets! During the emergency, I couldn't believe the juvenile behavior that was displayed. We argue that CW is supposed to be the "buffer to keep the riff-raff out." Well, a few of the sick individuals who seem to pop up whenever something important is being done must not be aware of this fact.

Most of the nets I monitored were run well and efficiently. The operators in the affected areas were, in most cases, using low power and simple antennas. It was sometimes a chore just to hear them. The net controls exhibited extreme patience under tough conditions and they are to be commended. As for the sick individuals who insist on disrupting vital communications, they do need help. Watching TV footage of the hurricane makes one realize that this was not a game, an exercise to amuse the hams, but a real emergency. Peoples homes and businesses were swept away in a matter of hours.

To all who helped, even if only standing by, good job. To the jammers, go crawl back under your rock!—*John Meyers, KD8MQ, Alliance, Ohio*

 QST

The Train Without a Whistle

By C. Russell Allor, N5ADF, ARRL SEC, Louisiana

Grosse Tete, Louisiana is a small bayou town surrounded by Bayou Grosse Tete, Interstate 10, and the Union Pacific Railroad. Local people are accustomed to freight trains rumbling through town several times a day, blowing their whistle at the crossings.

On Thursday, June 8, 1989, shortly after 6 AM, some of the townspeople heard the familiar rumbling train sound, but "it had no whistle blowin'" as stated by one person in a later interview. It was in fact a violent tornado that destroyed about a third of the homes in this tiny town.

The funnel cloud roared out of the Atchafalaya basin, across cultivated fields, the railroad, and into the town that morning. To our amazement, only two fatalities and a couple of dozen injuries resulted. Even the Baton Rouge weather bureau didn't expect tornadoes. Warnings and watches had been called off earlier, and 6-AM radar showed only a thin line of rain on the trailing edge of a frontal system. The

tornado took everyone by surprise.

The event was first reported on the Rosedale repeater, located four miles to the north. Within minutes, Avery Bossier KB5HPQ reported the unbelievable destruction. The State Police was immediately called on Baton Rouge's 19/79 repeater, 20 miles away. Within the first 30 minutes, welfare messages and calls for emergency personnel were being handled on the local autopatch.

Law enforcement personnel set up a command post at a local truck stop. Communications were maintained between the command post and hams who were assisting Red Cross volunteers in planning shelters at the Grosse Tete Lions Club and, later, at the T. A. Levy school in Rosedale. Amateur Radio Service communications equipment was in place and on the air by 9:45 AM.

The devastating winds did not end their destruction at Grosse Tete. Soon after the tornado had left there, it was sighted near Baton Rouge by Chauncey Patterson, WA5TZU. The 19/79 repeater was utilized to contact the National Weather Service in

Baton Rouge to pass on eye-witness reports. Based on the integrity of past reports by hams on the local SKYWARN net, the NWS issued a tornado warning for the surrounding area.

During the next hour, other tornadoes were spotted by hams from Iberville, Livingston, Pointe Coupee and East Baton Rouge Parishes.

Later in the day, the National Guard arrived at Grosse Tete to prevent looting. Additional hams were called in to assist both the Guard and local law enforcement officials with the job of watching the town that evening.

Communications were maintained through the weekend until 6 PM Sunday when operations officially ended for the ham operators. Some of these dedicated Amateur Radio Service volunteers had little or no training and had never been involved in this type of public service communications activity. In spite of this, these individuals and the other sixty-or-more hams that participated in the communications emergency are to be commended for a job well done.

Oregon Amateurs Assist USFS

By Frank Erickson, Eagle Cap Ranger District, Enterprise, Oregon

When Forest Service fire fighters began battling the 8000-acre Summit Fire in northeastern Oregon last summer, they were faced with a serious problem: they had no way to communicate with the outside world.

The Summit Fire, caused by several lightning strikes on July 26, was situated on the western rim of Hells Canyon in the Wallowa-Whitman National Forest. The fire burned rapidly through steep, rough country that is hours from the nearest town, tiny Imnaha. To say that the area is remote is somewhat of an understatement.

The existing two-way radio system on the Wallowa-Whitman National Forest was overtaxed with traffic from other fires, and no portable fire communications systems

were available. To solve the problem, fire managers looked to local Amateur Radio operators for help.

Within hours, local operators mobilized to establish a communications system for the Summit Fire. Gene Wilson, W7FRM, a 50-year veteran of both Amateur Radio and commercial broadcasting, coordinated the effort from his home in Enterprise. As well as being an experienced radio operator, Wilson had first-hand knowledge of the terrain in the vicinity of the fire, as well as experience in dealing with emergency situations.

Three lines of communication were established: two utilizing a pair of 2-meter simplex frequencies, and another utilizing the Spout Springs repeater, located between Pendleton and Elgin, some 5500 feet up in the Blue Mountains. The repeater operates under a special-use permit from the Forest

Service, and provides three-state coverage and, in this case, noise-free communications from the Summit Fire base camp, some 70 miles away, to fire dispatchers in LaGrande, 30 miles from the repeater.

Forest Service communications specialists Mike Reagan and Mark Armstrong had nothing but praise for the radio operators. "The hams are a good resource to draw on," commented Armstrong. "Without them, communication would have been limited and certainly inadequate."

"They helped us with a critical communication problem for 18½ hours on last year's Tepee Butte Fire," said Reagan, who is a radio operator himself. "They're back helping us again this year, donating both their time and equipment. We owe them a great deal of thanks and a pat on the back."

Field Organization Reports August 1989

(The Field Organization reports appearing in September QST were actually those from June rather than July 1989.)

Section Emergency Coordinator Reports

Twenty-four EC reports were received, denoting a total ARES membership of 17,068. Those sections reporting were: AZ, GA, IA, ID, IN, KY, ME, MI, MN, MO, NFL, NH, NM, OH, OK, OR, ORG, RI, SD, SDG, STX, VA, WWA, WTX.

Cycle Four

Area Nets

EAN	31	1090	35.1	1.265	95.4
CAN	31	904	29.1	1.056	100.0
PAN	29	702	24.2	.798	96.7

Region Nets

1RN	62	549	8.86	.625	97.0	100.0
2RN	52	186	3.57	.418	78.4	96.7
3RN						93.5
4RN	62	306	4.94	.440	60.0	93.5
5RN	62	896	8.05	.560	87.7	100.0
6RN	62	243	3.92	.408	91.9	100.0
7RN	62	413	6.66	.674	89.2	100.0
8RN	59	301	5.10	.400	90.0	96.7
9RN	62	279	4.50	.400	95.6	100.0
TEN						100.0
TWN	52	199	3.83	.294		91.9
ECN						96.7
ARN	31	105	3.38	.091		90.3

*PAN operates both cycles one and two.

ARRL Section Traffic Managers reporting: AL, AR, CT, DE, EMA, ENY, EPA, GA, IA, IL, IN, MDC, ME, MI, MN, NC, NFL, NLI, NTX, OH, OK, OR, ORG, RI, SD, SB, SFL, STX, TN, VA, VT, WMA, WNY, WPA, WTX, WWA.

WB8KWC	63	K4BGZ	56
66	WB2QIX	NC9T	N4ORZ/T
WB0UD	K1GGS	WA4LLE	55
K8COF	N0CYR	WA2UKM	N4LST
WB8YPG	KB5CPY		54
K8CPS	W6SX	KB5JVU/T	KA6HJK/T
KB4CAU	WA4YYQ	W4IBU	53
KK4FV	KA2KJF	N8INP	KA2JMA/T
WA4RUE	W3YVQ	W9UMH	49
		KA7WFW	49
65	62	KB4OPR	KA1RSY/T
NW8M	WA8DHB	KA0ARP	N0KIA/T
WB5YDD	WA4RNP	KD0NH	KA9TVU/T
KA1KML	N8FWA	N2DXP	47
N2HLZ	K14W		KA1HPO/T
K2TWZ	KA4FZI	59	KA6TND/T
		KA9CTW/T	
64	81	KE2JX	42
W2FR	KA2NZZ/T		KA2UIU/T
W7LX	W1TC	57	WB2ZIE/T
WT0E	M5C	N2EVG/T	
KD0YL	WB8KBW	WA2PAC	44
WB2FTX	KA7EEE		N6VMK/T

The following stations qualified for PSRR during the month of July, but were not included in last month's Public Service Column: KB2EPU, WB2VUK, N5MEA, K16ZH, W67H, W8AKF, A10D, WA0HTN, ND0N, W0UD. (June) W8AKF 258.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	107	86.30	476	1001
TCC Central	93	95.00	371	389
TCC Pacific	90	72.58	346	671
Summary	290	84.62	1193	2061

Cycle Three

TCC Eastern

Cycle Four

TCC Eastern				
TCC Central	71	76.30	382	793
TCC Pacific	200	83.06	479	949
Summary				

TCC ROSTER

Eastern Area Cycle 2: KW1U Director, K1EIC W1FYR K1GRP KT1Q W1QYV KW1U WA2FJJ W2FR NN2H WB2MNA W2MTA KA2UBD N2XJ N3AZW N3EMD NC3V WA3YLO AA4AT W4FRF N4GHI N4JL WB4PNY N4SS WB8O KA8CPS WT8L WD8LDY W8PMJ N8S WB8YDZ W8YP VE3ORN.

Eastern Area, Cycle 3 & 4: KN1K Director, N2IC ND5T K6LL W6EDT W6VZT WF6O KA7CRT KN7H NR7E W7EP W7GHT W7LG W7VSE K0DJ K0SN K0TER KC0D KJ0G.

Central Area, Cycle 2: N0FBW Director, WA4JDH W6CTZ KD5KQ AE5I NS5M K5UPN WB5YDD W5YQZ KE5ZV KA9FEZ KA0EPY W0FE WB0WNJ VE5KZ.

Central Area, Cycle 4: K5GM Director, WB5J W5JDF KM5L K5MXQ N5TC K5TL W5TFB W5TNT KB5W W9CBE NR9K W9KLN KA0EPY W0GRW A10D NR0S NB0Z.

Pacific Area, Cycle 2: ND5T, Director, W5JUV K6UYK WF6O K16ZH W7AMM VE7EIL KF7R W7TGU W7IGC N0IA WA0YNP.

Pacific Area, Cycle 4: K0DJ Director, N2IC ND5T K6LL W6EDT W6VZT WF6O KA7CRT KN7H NR7E W7EP W7GHT W7LG W7VSE K0DJ K0SN K0TER KC0D KJ0G.

National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN	31	867	28.00	.676	90.0	
CAN	31	756	24.39	.466	100.0	
PAN*	56	345	6.16	.414	88.2	

Region Nets

1RN	62	453	7.30	.454	91.0	100.0
2RN	54	200	4.07	.358	84.8	96.8
3RN	31	142	4.60	.370	83.1	93.6
4RN						100.0
5RN						100.0
6RN	62	61	.98	.154		96.4
7RN						100.0
8RN	62	386	6.22	.317	98.9	100.0
9RN	62	380	6.12	.383	92.8	100.0
TEN	62	523	8.43	.317	84.0	100.0
TWN	61	392	6.43	.526	81.0	96.4
ECN						54.8

Cycle Three

Area Net

EAN	31	222	7.16	.497	77.4	
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Region Nets

1RN	31	56	1.81	.197	92.2	100.0
2RN	29	131	4.51	.384	97.9	87.1
3RN						93.5
4RN						87.1
8RN						96.7
ECN						64.5

Public Service Honor Roll

This listing is available to amateurs whose public-service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max 30; (2) Checking into phone/RTTY nets, 1 point each, max 30; (3) NCS CW nets, 3 points each, max 12; (4) NCS phone/RTTY nets, 3 points each, max 12; (5) Performing assigned NTS liaison, 3 points each, max 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points max; (9) Participating in a public service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, upon sending written notification to ARRL Public Service Branch, will be awarded a special PSRR certificate from HQ. This certificate is a one-time award, ie, it is not issued more than once.

453	107	94	79
KC9CJ	ND2S	K4IWW	W4QAT
369	WB7WOW	K5MXQ	WB5J
WD8V	WB2ZJF	N4MEJ	WD0GUF
322	W9CBE	KT9I	78
WB8AKF	KA2VZX	N6NLW	KC9CJ
161	WB6DOB	93	K5UPN
WB2OWO	WA7MCL	NN2H	W3VR
157	N5NZH	KA81AF	N3AZW
WT0G	KF8AU	WA4EIC	K0YFK
155	K8TVG	W3FA	WA2GYM
WA2SPL	W7VSE	92	K1UGM
149	N9BDL	WA2ERT	KA1IFC
N4GHI	105	WB6SYA	WA4JDH
136	WF6O	WB4KSG	WT8L
WG9J	104	K4ZK	WB1BTJ
KD8HB	WA4JDH	91	15
N4EXQ	KD8HB	WD8KQC	K14FL
134	W2QNL	KA9FVX	WF6O
103	130	90	W7VSE
KA1S	W12G	KJ9J	K16ZH
KJ4VT	129	89	WT7A
102	W2MTA	WB4WQL	KA9FEZ
KW1U	128	88	KF5BL
KG2D	WT7A	N2AKZ	N4GHI
W6VOM	126	N2IMP	WA9VND
87	KF5BL	73	W2MTA
K4MTX	123	86	NM1K
W9HBI	N1CPX	85	AJ6F
KC3Y	120	W5CTZ	
86	WB4VMX	W7LNE	
W5CTZ	117	N2GPA	
W7LNE	WA1TBY	N0JL	
N2GPA	116	K3JL	
W2OEV	W9YCV	85	
ND0N	115	NO3M	
KB5BNU	WA9VND	WT8L	
N4KSO	114	WB4ZTR	
	K4NLK	KC4BHX	
	K16ZH	KM4LS	
	N2XJ	84	
	WA4GXT	70	
	111	W1KX	
	WB2VUK	N8HSC	
	W1PEX	K8JDI	
	WA0HTN	KA8WNO	
	W0OYH	K4ZUY	
	N5NAV	K2VX	
	W4ANK	81	
	110	K2YAI	
	N7JLC	N1FNN	
	KD7ME	NR9K	
	109	K3JX	
	K0BFX	AC5Z	
	WB8SYA	W8J	
	K5CXP	KD8KU	
	108	WS8A	
	N5MEA	NB2D	
	W44PFK	NJ3V	
	WA9W	K4GCK	
		95	
		N1DHT	
		N8EFB	
		NZ5J	

Brass Pounders League

The BPL is open to all amateurs in the United States, Canada and US possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in the standard ARRL form.

The Brass Pounders League Medallion is available to individual operators who achieve BPL and are listed in the BPL column for the third time. This medallion is a one-time-only award, ie, it is not issued more than once. It is not necessary that the three months involved be consecutive. Any three months will qualify an operator. Stations that qualify for the BPL medallion, upon written notification of the qualifying months to the ARRL Public Service Branch, will be awarded the call sign-engraved BPL medallion.

Call	Orig	Rcvd	Sent	Divd	Total
WB8AKF	309	1821	2499	305	4934
W3CUL	962	891	1432	71	3356
WB0TAX	0	1536	1536	0	3072
W1PEX	7	695	1614	13	2329
WB9YYP	0	1292	114	841	2247
W3WI	0	1080	1107	0	2187
KB4N	0	675	672	0	1347
K0HOA	2	536	537	1	1076
N0BQP	19	596	22	421	1058
KC9CJ	8	572	74	352	1006
K5UPN	3	500	472	8	983
W3VR	281	199	402	27	909
N3AZW	12	421	421	19	873
K0YFK	32	410	401	23	866
WA2GYM	38	366	401	43	848
K1UGM	0	412	412	0	824
KA1IFC	0	332	310	20	762
WA4JDH	0	377	406	3	706
WT8L	0	314	368	3	685
WB1BTJ	0	197	415	0	612
WG9J	15	321	212	28	576
K14FL	2	283	285	0	570
WF6O	14	266	278	12	570
W7VSE	0	314	252	3	569
K16ZH	29	257	248	18	552
WT7A	7	279	239	24	549
KA9FEZ	—	—	—	—	546
KF5BL	15	210	291	25	541
N4GHI	8	258	234	23	523
WA9VND	4	270	229	19	522
W2MTA	13	307	197	3	520
NM1K	34	215	251	16	516
AJ6F	0	251	251	0	502

BPL for 100 or more originations plus deliveries:

WB6BZQ	193	WB2OWO	132
WB2QMP	144	W5TNT	120
NR9K	143	W0FIR	105

The following stations qualified for BPL during the month of July, but were not listed in last month's issue: N5MEA 613, W8AKF 3959, WB0WJ 958, KT9I 746, KA1IFC 621. (June) W8AKF 3346.

Independent Nets

Net Name	Sess	Tfc	Check-ins
Amateur Radio Telegraph Society	27	339	399
Early Bird Net	31	589	201
Empire Slow Speed Net	31	62	367
Golden Bear Amateur Radio Net	31	64	1485
Great Lakes Emergency Traffic Net	31	58	1076
IMRA	27	656	1589
Mission Trail Net	31	164	867
Northern California Net	93	345	1229
NYSPTEEN	31	59	407
Southwest Traffic Net	31	210	1383
West Coast Slow Speed Net	30	44	353
7290 Traffic Net	50	340	3277
75 Meter ISSB Net	31	169	1034

old hand at MS, W2RS, had particularly good fortune working CY0DXX (Sable Island, FN93) for a new country and grid on 2 meters.

Sporadic E, or E Skip, as the 2-meter gang likes to refer to it, persisted into late August. W7JF in Billings, Montana, writes that on the 24th, beginning at 0225Z, he worked 12 stations in Missouri, Illinois, Tennessee and Georgia. The Georgia station was W4GJO in EM74, who Ken worked during another E_s opening June 1 for state number 47.

Many on both 6 and 2 meters characterize the E season based on the openings on their favorite band. But the only person that I know of who keeps accurate records is WA5IYX in San Antonio. Pat's favorite span of frequencies to monitor is the 88- to 108-MHz FM broadcast band. Thus, he doesn't have to be concerned about lack of activity. His figures for summer 1989 show what many of us suspected: much more E_s during July than June. This is counter to most years. For July 1989, Pat's records show 3720 minutes of E_s at the FM band compared with 1420 for June. For 1988, the numbers were 1130 for July and 4606 for June—a more typical situation.

N5KWB reports a fine tropo event beginning about 0100Z September 4. From his EM32 location in Louisiana, Tom worked 48 2-meter sta-

tions in 22 grids as far away as EN81. On 1 1/4 meters, he hooked up with 13 stations in nine grids, with EN81 his best effort. The opening boosted his 1 1/4 total by six states. N5DUH in Bossier City, Louisiana, also in EM32, encountered the same conditions. It was Keith's first experience with a good tropo opening, having been on the band only two weeks. Despite being limited to 25 W, he made the best of it—working 19 new grids and 10 states. Another new convert to 2-meter SSB, WA4PGM, in FN07, says he has worked 11 states and 31 grids in five weeks of operation, running 10 W to a 16-element Yagi at 12 feet. Catching some good E_s openings during July was part of the secret of his success.

Although it may be old hat by the time you read this, it's very encouraging to watch 6 meters in the final days of summer. The band is beginning to show signs of coming to life in various parts of the world. ZS6WB reports an opening to Japan during the morning hours of August 29. Hal says that signals ranged up to S-9, but only a few stations were on at each end of the path. On August 30, he caught FD1NLQ/7X for country number 35. The next evening, signals to the Mediterranean were very good, with ZC4MK in Cypress participating in his first good opening to southern Africa. On this side of the world, the west coast has already caught at least one opening to VK, and the afternoon of August 29

produced contacts with HP3XUH and LU1DMA for this conductor. Later in the evening, about 0245Z on the 30th, I worked LU9EHF with S-9 signals.

In the sad news department, K3QMX passes along the information of the death of N4HRH. Walt will perhaps be better remembered as VP9WB.

W4HHK sends along details of his 23-cm beacon. The frequency is 1296.237 MHz and the power is 4 W. The antenna is bidirectional (east-west) and uses a 2-wavelength waveguide section. The beacon has been heard as far as Dallas and Chattanooga.

The west coast microwave travelers have been out again. This time, W6HCC set up camp at Blue Ridge in DM14di at an elevation of 7200 feet, while WA6EXV set out for Castle Cliffs, just south of St. George, Utah in DM37bc. Although conditions were not particularly good, the two stations did manage 3-cm contacts on SSB and CW over the 286-mile path. An attempt on 13-cm failed. WA6EXV's next effort was from 11400-foot Brian Head Mountain in DM37nr. After the first try failed, a sked was arranged for the next morning. At that time, they were able to complete a 10-GHz CW contact over the 356-mile path, but signals were too weak for SSB.

QST

FM/RPT

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

Simply Say Simplex—with Caution

In the last FM/RPT, Jeff Towle, WA4EGT, asserted that hams should not tie up repeaters when they can communicate as well on a simplex channel. Not to knock the fine art of simplex operation, this month's writer, George Hinds, N8CIX, suggests that we use caution when selecting a simplex frequency.

There is a long history of experience in the development of channelized FM communications based on the technical parameters of the equipment used. Almost as long in development is band planning for channel use with a goal of attaining maximum use with minimum interference to users.

The ARRL band plans did not arise from pipe dreams or the exercise of individual rights. They arose from the experience of the public safety and commercial users who were familiar with VHF-UHF band planning. This band-planning experience permitted those agencies to operate efficiently within equipment limitations and was brought to Amateur Radio by the first hams to work 2-meter FM. Many of those hams were radio technicians for public safety agencies and utilities who used surplus VHF high-band rigs to begin amateur 2-meter FM.

They learned about interference caused by adjacent-channel operation. Bandwidth limited the closeness of channel spacing,

however, improved equipment changed channel spacing. At first, 60-kHz spacing was essential, but, as rigs improved, 30-kHz separation became possible. As the demand for spectrum increased, closer spacing (15 kHz) was adopted with distance separating adjacent users. As most FM enthusiasts know, you still cannot put 15-kHz-spaced repeaters within 60 or 70 miles of each other without some interference to either the repeater, its users, or both. Much of the gear we use today simply cannot operate interference-free in such conditions. And it certainly cannot operate interference free with a mere 10-kHz channel spacing, when the transmitted signals are deviating 5 kHz on either side of the center frequency!

Considering the need to understand why we devise and follow band plans, perhaps questions should be included in VE-testing on channelized operation, the reason for band plans and how to avoid being the source of potential interference to others. Obviously, many hams do not know from whence we came in regard to the development of the FM mode.

One Pikes Peak area repeater recently was bothered from time to time by noisy, mostly unreadable signals on the repeater input, but not from its regular users. It turned out that

a small group of folks in Longmont, Colorado, had decided that no one was using a particular frequency, so they decided to make it their own private simplex channel. Why not? Well, if they had checked *The ARRL Repeater Directory*, they would have quickly noted that their choice was, in fact, a repeater input. It would have shown them that simplex operation in that segment of the 2-meter sub-band was inconsistent with the accepted band plan. With 25 two-meter simplex channels available, 17 of which are simplex only, why would an otherwise intelligent person choose to operate simplex on repeater inputs? Why toss years of experience out the window and operate contrary to time-proven guidelines?

We pride ourselves as being responsible amateurs, able to police our operations through self-discipline. But, obviously, not everyone accepts that responsibility. Back in 8-land, where I came from, we termed operators guilty of such sloppy operation as "lids, kids and space cadets."—George Hinds, N8CIX, from *Ø Beat*, the newsletter of the Pikes Peak Radio Amateur Association (PPRAA), Inc., of Colorado Springs, Colorado. PPRAA meets the second Wednesday of each month at the Colorado Springs Hewlett-Packard facility at the junction of Lexington and Union.

QST

New OSCAR Horizons Now In View

This month, we'll look at the next series of OSCARs to be launched. According to the latest estimate, a group of six OSCARs will be launched this month.

The launch on an Ariane Ariane-4 rocket will carry SPOT-2 as the primary payload together with six OSCARs from five different organizations. Articles in the May and June 1989 issues of *QST*¹ addressed the AMSAT-NA, AMSAT-LU, BRAMSAT and Weber State College Microsats. The other two new satellites are being built at the University of Surrey, England, where UoSAT-1 and 2 (UO-9 and UO-11) were born. What follows is a description of Surrey's new UoSAT-D and UoSAT-E projects that comprise the balance of the six OSCARs being launched.

According to the UoSAT Unit at Surrey, UoSAT-D and UoSAT-E will take on the mission objectives of the postponed UoSAT-C mission:

- Amateur Radio packet communications and the advancement of store-and-forward communications technology.
- Studies of the orbital radiation environment and its effects on semiconductors.
- In-orbit demonstration and evaluation of novel spacecraft technologies.
- Development of low-cost charge-coupled device (CCD) imaging techniques.
- Refinement of low-cost, computer-controlled attitude determination and control systems.

Packet-Communications Experiment

The primary payload on UoSAT-D will be the Packet-Communications Experiment (PCE), which was to be carried on UoSAT-C. The PCE is an orbiting packet node with 4 Mbytes of message-storage space. The PCE advances the work done on UoSAT-2 with the Digital-Communications Experiment (DCE). The PCE system (hardware and software) is being developed under a contract from the Volunteers In Technical Assistance (VITA), who hope someday to use store-and-forward communications as a link with development workers in remote areas. The flight of the PCE on UoSAT-D and its use by radio amateurs is funded by AMSAT-UK.

All amateur stations with proper equipment will have open access to the PCE via AX.25 packet radio. The UoSAT-D PCE will use 9600 bit/s frequency-shift-keyed (FSK) uplinks and downlinks. These protocols will be compatible with existing modems from G3RUH and K9NG. The band plan will be Mode-J: a single uplink in the 2-m band, and

For more information on getting started on OSCAR and information on AMSAT membership and membership benefits, call AMSAT at 301-589-6062 or write: AMSAT, PO Box 27, Washington, DC 20044. Please include a business-size SASE.

a downlink in the 70-cm band. RF links should be good enough to provide consistent service to ground stations with modest, unsteered antennas, and an experimental high-power mode for very small ground stations will be included.

Although the UoSAT/AMSAT-UK PCE will use standard AX.25 communications links, it will also provide a platform for experimentation with higher-level packet-communications protocols. Current PACSAT systems employ ALOHA access (each station transmitting when it wants to) and user interfaces based on terrestrial BBSs. The PCE will employ experimental access techniques aimed at more efficient machine-to-machine communications. The user-friendly BBS-like interface will be on the ground, in the ground station's personal computer or TNC. The ground station and the satellite will communicate using high-level protocols, making the best use of short satellite passes. Software to support these ground station-to-satellite protocols (along with complete specifications of the protocols) will be developed at UoSAT and made available to the Amateur Radio community.

The UoSAT/AMSAT-UK PCE will be at one end of the spectrum of amateur-satellite store-and-forward communications systems. By the end of 1989, amateurs will be able to select a PACSAT facility that suits their communications needs and capabilities, choosing from UO-11, FO-12, the AMSAT-NA Microsats and UoSAT-D. (JAS-1B is scheduled to be launched in early 1990. It's an up-graded FO-12.)

Cosmic-Particle and Total-Dose Experiments

The Earth's magnetic field shields the surface of the planet from much of the radiation emitted by the sun and other cosmic sources. Satellites in orbit, however, are not protected by this magnetic shield, and they receive high levels of cosmic radiation. Assuming the satellite has survived the rigors of launch, radiation is the primary threat to a satellite's electronics. The total dose of radiation absorbed by semiconductors causes them to fail, as happened to the AMSAT OSCAR-10 Integrated Housekeeping Unit

(IHU). Less dramatic—but equally serious—are the temporary effects of energetic particles entering semiconductor memories. These particles cause Single-Event Upsets (SEUs), changing the contents of memory. This can cause computers to crash or data to be corrupted. Satellites are becoming more reliant on microprocessors, peripherals and memories, and as more functions are placed on smaller and smaller ICs, the ICs become increasingly radiation sensitive. Measurements of radiation levels in space and observations of radiation effects on satellite electronics help designers select the correct components for future satellites.

With this in mind, the UoSAT unit has conducted a series of in-orbit radiation experiments. UoSAT-1 carried Geiger counters for measuring radiation, and the on-board computer (OBC) has an SEU monitor on its memory. On UoSAT-2, radiation-effects monitoring was taken a step further. The Particle-Wave Experiment (PWE) monitors the electron flux spectrum at eight energy levels. The 1802 OBC has an SEU counter, and the DCE and data store and readout (DSR) monitor SEUs in a total of 300 kbytes of memory.

UoSAT-D will continue this series of experiments with a Total-Dose Experiment (TDE) monitor and a Cosmic-Particle Experiment (CPE) detector. The TDE will allow—for the first time—direct measurement of the absorbed radiation dose at various points in the satellite. This will allow assessment of shielding provided by the satellite structure. The TDE uses seven radiation-detecting FETs monitored by an 80C31 microcontroller. The CPE detects cosmic particles as they pass through a diode array. As the cosmic particles pass through the diodes, they deposit a charge that is measured by a charge-integrator circuit interfaced to the 80C31. The measured charge can reveal the energy of the particle and the angle at which it entered UoSAT-D. This CPE/TDE package, along with SEU monitoring on the 4 Mbytes of PCE memory, will significantly increase the amount of information available to designers of computer systems for satellite use. The CPE/TDE will send its data to a file in the PCE, where it will be available to users of the PCE who want to follow the radiation experimentation. The CPE/TDE is funded by the Harwell Laboratory (UK).

On-Board Data Handling

UoSAT-D will have a standard UoSAT 1802 OBC to assist the 80C186 as necessary. Both computers will be interfaced to a central telemetry system monitoring 32 analog channels throughout the satellite. Telemetry will be available direct to the downlink through

¹D. Loughmiller and B. McGwier, "Microsat: The Next Generation of OSCAR Satellites," Part 1, *QST*, May 1989, pp 37-40; Part 2, *QST*, Jun pp 53-54 and 70.

hardware interfaces, or it can be gathered by the 80C186 and presented as AX.25 packets. This system combines the reliability of an all-hardware system with the flexibility of computer-driven packet telemetry.

The three computers on UoSAT-D (1802, 80C31, 80C186) will be linked to each other and to uplinks, downlinks, telemetry and telecommand through a multiple-access, serial data-sharing bus. This bus eliminates many of the dedicated serial links present in UoSAT-1 and UoSAT-2, without eliminating the redundant data paths that are available if primary paths fail. The bus interface is a simple circuit that can be added to any UART chip.

Attitude Control

UoSAT-D will be an Earth-pointing satellite that uses a gravity-gradient boom augmented by computer-controlled magnetorquing. This system (which uses no continuously moving parts or expendable fuels) is ideal for small, inexpensive satellites in low-Earth orbit. UoSAT-2 has maintained a pointing stability of 5 degrees using this system, and it is hoped that improved algorithms and increased computing power available on UoSAT-D will result in even better results.

UoSAT-D and UoSAT-E Modular Design

The modular design developed for UoSAT-C proved itself when the UoSAT team had to change emphasis to the UoSAT-D and UoSAT-E missions. Although UoSAT-D and UoSAT-E must be lighter and smaller than UoSAT-C, many of the mechanical and electrical subsystems for UoSAT-C could be simply taken apart and reassembled in a new order to make UoSAT-D and UoSAT-E.

What About UoSAT-E?

The UoSAT-E satellite will be based on the same bus as UoSAT-D: OBC, telemetry, telecommand, power generation and

conditioning, and mechanical structure will remain the same. The compliment of payloads and experiments, however, will change. UoSAT-E will be primarily a technology-demonstration mission, flying the transputer data-processing experiment (TDPE), Solar Cell Experiment (SCE) and CCD-imaging system that were to fly on UoSAT-C.

Transputers

The TDPE is a parallel computing system based on three transputer parallel-processing microcomputers. The three transputers can be used in parallel on different parts of a single task, greatly improving computing speed. They can also be used to monitor one another, watching for erratic behavior that might result from a radiation-induced SEU. Both the increased performance of the parallel-processing arrangement and the increased reliability of the watchdog arrangement will be studied. Results of this study will be used by the European Space Agency Technical Labs (ESTEC) in the design of high-performance, on-board data-handling systems for future satellites.

Advanced Solar-Panel Technology

The UoSAT-E SCE is an array of solar-cell samples that will be constantly monitored for changes in performance caused by radiation, temperature, and other environmental effects. The cells will represent the complete range of solar generator technologies under development: gallium arsenide, indium phosphide and silicon. The cells will be covered by various cover slides designed to enhance panel efficiency and/or reduce panel degradation caused by radiation. The SCE panel will replace part of a solar panel on UoSAT-D.


The SCE monitoring system will wait until the sun is directly upon the SCE, and then make a series of measurements. These data will be sent in a burst to the satellite's 1802 OBC for later downloading.

CCD-Camera-Imaging Experiment

The UoSAT-E CCD camera will continue the series of UoSAT experiments with these low-cost imagers. UoSAT-1 carried one of the earliest two-dimensional CCD arrays: certainly the first in orbit. The results from this imager were spectacular when one considers the novelty of the technology, although the fact that UoSAT-1 is not stabilized makes the imaging somewhat random(!). The UoSAT-2 CCD camera is a high-sensitivity system intended to take images of the auroral oval as UoSAT-2 passes over the poles. The camera is connected to two 96-kbyte memory banks with serial readout and error-detection-and-correction coding. Unfortunately, results from UoSAT-2 have been inconclusive. No readily identifiable images have been downloaded. UoSAT-E will carry another CCD camera, optimized for meteorological-scale imaging. The resolution of the system will be on the order of 1-2 km, with a field of view 1000 square km. The inclusion of this system on UoSAT-E is a response to widespread interest in medium-resolution imaging for low-cost meteorology satellites.

The UoSAT-E camera will generate a 96-kbyte raw image, which will be sent to the TDPE where the parallel processors will compress the image for transmission. The data-compression stage will provide a 50- to 90-percent reduction in the amount of memory required to store an image. This also decreases the downlink time required to transmit a picture to a ground station.

Conclusion

The PCE on UoSAT-D will provide a packet-radio networking experiment and a service to radio amateurs worldwide. The various technology and engineering experiments on UoSAT-D and UoSAT-E will continue the important transfer of information between Amateur Radio and the professional engineering community. 

New Products

HUSTLER 22-INCH MAST FOR HF-MOBILE ANTENNAS

☐ Hustler, manufacturer of a popular line of HF-mobile antennas, has introduced the MO-4, a 22-inch mast designed for various mounting arrangements to allow the use of Hustler's line of HF resonators on vehicles with plastic bumpers. The MO-4 can be mounted on roof racks, trunk lids, mirrors, ladders, etc, and when used with Hustler's standard resonators, the MO-4 can be used with a magnetic mount.

The MO-4 is supplied with three 30-inch

tip rods for use with the 10, 15 and 20-meter resonators; these tip rods are used in place of the rods supplied with those resonators. (The 30-inch rods are required to resonate the system with the shorter mast; no rod changes are necessary with the 40, 75 and 80-meter resonators.)

Suggested retail price for the MO-4 is \$19.95. For more information, contact Hustler, Inc, One Newtronics Pl, Mineral Wells, TX 76067, tel 817-325-1386. —*Rus Healy, NJ2L*



Hamfest Calendar

Administered By Bernice Dunn, KA1KXQ
Convention Program Manager

Attention: The deadline for receipt of items for this column is the 5th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in QST of prizes of any kind and games of chance such as bingo.

†**Alabama (Montgomery)**—November 18. *Sponsor:* Montgomery ARC. *Time:* setup 6 AM, public 8 AM-3 PM. *Place:* Garrett Coliseum at the South Alabama State Fairgrounds on Federal Dr. *Features:* free parking, flea market, VE exams (code testing begins at 8 AM, written exams begin at 9 AM; bring a copy of your current license, picture ID and \$2), special hamfest rates at: Knight's Inn, 1-85 at Ann St, (\$28.50 + tax for up to 420 guests, desk phone 205-834-4055 or 800-722-7220 for central reservation operator; Coliseum Motel across the street from hamfest site, single \$23/double \$29 + tax, phone 205-265-0586. *Talk-in:* 146.24/84, call W4AP, Ragchew 146.32/92 (with phone patch, *up/#down), 147.78/18, 444.50/449.50. *Admission:* free. *Contact:* Hamfest Committee, c/o 2141 Edinburgh Dr, Montgomery, AL 36116, or Phil 205-272-7980 (after 5 PM).

†**Arizona (Apache Junction)**—December 2-3. *Sponsor:* Superstition ARC. *Time:* Saturday dawn to dusk, Sunday dawn to noon. *Place:* P & M Rodeo Grounds, Brown and Meridian Rds. *Features:* refreshments, ARRL Division Director, ARRL Section Manager. *Talk-in:* 147.72/12. *Admission:* \$1 per person, \$3 per vehicle for tailgaters. *Contact:* Bill or Marge Glaze, KA7SUF/K1YCY, 602-832-3955.

Colorado (Denver)—November 5. *Sponsor:* Rocky Mountain Radio League. *Time:* setup 7 AM, public 9 AM-3 PM. *Place:* Jeffco Senior Ctr, 6842 Wadsworth Blvd, Arvada, CO. *Features:* swap, exhibits, refreshments, handicapped accessible. *Talk-in:* 146.34/94. *Admission:* \$2. *Tables:* \$7. *Contact:* (D) Dan Duryee, KB0J, 303-458-5444, (N) Fred Brachle, NØFIK, 8230 Reed Ct, Arvada, CO 80003, 303-425-5791.

Connecticut (North Haven)—November 12. *Sponsor:* South Central Connecticut ARA. *Time:* sellers 7 AM, public 9 AM-3 PM. *Place:* North Haven Park and Recreation Ctr, 7 Linsley St. *Features:* VE exams, commercial exhibits, refreshments, wheelchair accessible. *Talk-in:* 146.01/61. *Admission:* \$3, children under 12 free. *Tables:* advance \$12, door \$15 (reservations for tables must be received with a check by November 2; no reservations by phone). *Contact:* send SASE to SCARA Flea Market, PO Box 81, North Haven, CT 06473, or call Brad Oestreicher, WA1TAS, 203-265-6478, 7-10 PM.

Illinois (Grayslake)—October 29. *Sponsor:* Waukegan CAP. *Time:* 7 AM-5 PM. *Place:* Lake Co Fairgrounds, Rtes 120 and 45. *Features:* flea market, refreshments, free parking. *Admission:* \$3. *Tables:* \$5. *Contact:* send SASE to CAP, 637 Emerald St, Mundelein, IL 60060.

Illinois (Rockford)—November 12. *Sponsor:* Rockford & Experimental ARAs. *Time:* 8 AM-3 PM. *Place:* Junction of Illinois Rte 173 and Forest Hills Rd. *Features:* Amateur Radio and computer dealers, flea market, tailgating, refreshments, ample free parking, wheelchair accessible. *Talk-in:* 146.01/61, 146.52. *Admission:* advance \$3, door \$4. *Contact:* Lonnie Miller. Advance Tickets: SASE to Rockford Hamfest, PO Box 10003, Rockford, IL 61131, (N) 815-623-7576.

Indiana (Fort Wayne)—November 12. *Sponsor:* Allen County Amateur Radio Technical Society. *Time:* 8 AM. *Place:* Allen Co Way Memorial Coliseum Exposition Ctr. *Features:* parking \$1, meeting of the Indiana Repeater Council. *Talk-in:* 146.28/88, 443.80/448.80. *Admission:* advance \$3.50, door \$4. *Tables:* standard tables \$12,

premium tables \$25, ac power extra. *Contact:* AC-ARTS, PO Box 10342, Fort Wayne, IN 46851.

Massachusetts (Billerica)—November 18. *Sponsor:* 1200 Radio Club. *Time:* setup 10 AM, public 11 AM-4 PM. *Place:* Bull Information Systems, 300 Concord Rd, Billerica, MA 01821. *Features:* Ham and Electronics Auction. *Admission:* 15% sales commission; \$1 minimum, \$30 maximum. *Contact:* Dave Meldrum, KA1MI, 28 Cedar Ln, N Andover, MA 01845.

†**Massachusetts (Sturbridge)**—November 18. *Sponsor:* New England DX Convention. *Place:* Sheraton-Sturbridge. *Features:* afternoon session 1 PM, evening dinner 6 PM. *Contact:* Fred Lucas, K1EFI, 72 Long Meadow Hill Rd, Brookfield, CT 06804, 203-775-1896.

New Jersey (Newark)—November 11. *Sponsor:* RATS & NJIT ARC. *Time:* 8 AM-6 PM. *Place:* Hazell Ctr on the NJIT campus. *Features:* tech talks, VE exams from 8 AM-11 AM, commercial equipment, TNC tune-clinic, free parking. *Talk-in:* 144.59/5.19. *Admission:* free. *Contact:* Gordon Beattie, N2DSY, 201-387-8896 or N2DSY @ KD6TH via packet. For exam info contact Pete Adely, K2MHP, 201-796-6622.

†**New York (Suffolk/Long Island)**—November 12. *Sponsor:* Radio Central ARC. *Time:* 9 AM-4 PM. *Place:* Long Island Expy exit 62, north 1 mile to Suffolk Co Community College. *Features:* manufacturers, seminars, guest speakers, dealers, forums, VE exams, refreshments. *Admission:* advance exhibitors \$15, door exhibitors \$20, attendees \$4. *Contact:* John Mark, KB2QQ, 5 Indian Valley Rd E, Setauket, NY 11733, 516-689-6343.

North Carolina (Greensboro)—November 25-26. *Sponsor:* Greater Greensboro Hamfest. *Time:* Saturday 9 AM-5 PM, Sunday 9 AM-3 PM. *Place:* National Guard Armory, Franklin Blvd. *Features:* VE exams, forums, exhibitors. *Talk-in:* 146.16/76, 144.65/5.25. *Admission:* advance \$4, door \$5. *Tables:* inside \$12 per 6-ft table, good both days; outside paved tailgate space \$2. *Contact:* GGH, PO Box 8252, Greensboro, NC 27419, 919-292-6565 except Wednesdays. For exams contact TEARC, Jim Williamson, NQ4T, 3504 Stonehurst Pl, High Point, NC 27260, 919-841-7576.

Ohio (Massillon)—November 19. *Sponsor:* Massillon ARC. *Time:* setup 7 AM, public 8 AM-5 PM. *Place:* Massillon K of C Hall on Cherry Rd, (west from US Rte 21). *Features:* refreshments, free parking, auction at 11 AM. *Talk-in:* W8NP, 147.78/18. *Admission:* advance \$3.50, door \$4. *Tables:* \$7 per 8-foot space. *Contact:* Massillon ARC, PO Box 73, Massillon, OH 44648, SASE please.

Ohio (North Olmsted)—November 26. *Sponsor:* North Coast ARC. *Time:* 9 AM-2 PM. *Place:* North Olmsted Community Cabin, 28114 Lorain Rd, located between West Park and East Park Drives, north of Lorain. *Talk-in:* 144.69/5.29, 223.24/4.84. *Admission:* \$2. *Tables:* \$5 for 8-foot tables, \$3 for 4-foot tables. *Contact:* North Coast ARC PBBS (C NO8M-1 on 145.09), download the files entitled COMCABIN.LOC AND SWAPFEST.INF, or Chuck Early, K8RSH, 216-777-1595.

†**Pennsylvania (Washington)**—November 19. *Sponsor:* Washington Amateur Comm. *Time:* 8 AM-3 PM. *Place:* I-79 north from Washington, PA, exit 8W, "Racetrack Rd," I-79 south from Pittsburgh, exit 8, "Meadowlands." *Features:* refreshments, large parking lot. *Talk-in:* 144.89/5.49 W3CYO/R, 146.52. *Admission:* \$1. *Contact:* Walter Piroth, N3BKW, 225 W Pike St #4, Houston, PA 15342, (D) 412-258-5353, (FAX) 412-258-8342, (N) 412-746-2327.

South Carolina (Sumter)—November 11. *Sponsor:* Sumter ARA. *Time:* 9 AM-4 PM. *Place:* Sumter Co Exhibition Ctr, 700 W Liberty St. *Features:* VE exams (bring photocopy of license), flea market, ATV seminar, handicapped access, refreshments. *Talk-in:* 147.615/015 repeater WA4UMU/R. *Admission:* advance \$4, door \$5. *Contact:* Sumter ARA, PO Box 193, Sumter, SC 29151-0193 or call Ted Kreipe, KB4FIQ, 803-773-5189.

Texas (Odessa)—November 4-5. *Sponsor:* West Texas ARC. *Time:* Saturday 8 AM-5 PM, Sunday

9 AM-2:30 PM. *Place:* Holiday Inn Convention Ctr, Hwy 80 east of Odessa. *Features:* refreshments, forums, QCWA, VE exams. *Talk-in:* 147.40, 146.28/88, 146.10/70. *Admission:* advance \$5, door \$6. *Contact:* G. B. Brock, NG5R, 1126 East 44th, Odessa, TX 79762, 915-362-6069.

Wisconsin (Milwaukee)—November 4. *Sponsor:* Milwaukee Repeater Club. *Time:* sellers 7 AM, public 8 AM-1 PM. *Place:* Serb Hall, 51st and Oklahoma Ave. *Features:* swapfest, VE exams, handicapped accessible, free parking, refreshments. *Talk-in:* 146.31/91, 146.52. *Admission:* advance \$3, door \$4. *Tables:* 4-ft, advance \$4, door \$5. *Contact:* send check and SASE to Milwaukee Repeater Club, PO Box 2123, Milwaukee, WI 53201, 414-444-4589 (24-hour answering machine). ☐ST

Coming Conventions

SOUTH FLORIDA SECTION CONVENTION

November 18-19, 1989, Tampa

The South Florida Section Convention is sponsored by the Florida Gulf Coast Amateur Radio Council. It will be held at the Curtis Hixon Convention Center, 600 Ashley Dr. Doors are open on Saturday from 9 AM-5 PM and Sunday 9 AM-3 PM. *Admission:* advance \$5, door \$6. *Features:* include ARRL forum, DX, public service, VE exams (Saturday 1 PM, Sunday 10 AM), commercial exhibits, swap tables, packet, technical meetings, traffic handlers, MARS, AMSAT, Saturday evening dinner dance. *Talk-in:* is on 147.705/105, 224.74/223.14. For further information, contact Ticket Chairman, 1556 56th Ave N, St Petersburg, FL 33703, 813-525-5178.

TEXAS STATE CONVENTION

November 3-5, 1989, Houston

The Texas State Convention is sponsored by the Houston Ham Conventions, Inc, and Houston area ARCs. It will be held at the Sheraton Crown Hotel and Conference Ctr, 15700 John F. Kennedy Blvd. Doors are open on Saturday from 8 AM-5 PM and Sunday from 9 AM-2 PM. *Admission:* in advance \$5, door \$7, children under 12 free. *Features:* include ARRL Forum, Friday night auction (7 PM), seminars, VE exams, swap fest, commercial vendors, transmitter hunt, Saturday night dinner. *Talk-in:* is on 147.68/08, 222.66/224.26, and 146.52. For further information write Com-Vention '89, PO Box 742183, Houston, TX 77074-2183.

1989

November 3-5

Texas State, Houston, TX

November 18-19

Southern Florida Section, Tampa, FL

ARRL NATIONAL CONVENTIONS

June 8-10, 1990—Kansas City,

Missouri

August 23-25, 1991—Saginaw,

Michigan

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance.

†ARRL Hamfest



President: Richard L. Baldwin, W1RU
Vice President: Michael J. Owen, VK3KI
Secretary: Larry E. Price, W4RA
Assistant to the Secretary: Naoki Akiyama, N1CIX/JH1VRQ

Regional Secretaries:
John Allaway, G3FKM
Secretary, IARU Region 1
10 Knightlow Rd
Birmingham B17 8QB
England

Thomas B. J. Atkins, VE3CDM
Secretary, IARU Region 2
55 Havenbrook Blvd
Willowdale, ON M2J 1A7
Canada

Masayoshi Fujioka, JM1UXU
Secretary, IARU Region 3 Association
PO Box 73, Toshima
Tokyo 170-91
Japan

The International Amateur Radio Union—since 1925 the federation of national Amateur Radio societies representing the interests of two-way Amateur Radio communications.

Special-Event Station 9M8STA Promotes Amateur Radio in Sarawak

At the invitation of the Sarawak Tourist Association, a group of thirteen 9M2s from the Malaysian Amateur Radio Transmitters' Society (MARTS) went to the port city of Kuching, Sarawak, in August to set up the first-ever special-event station from Sarawak, effectively putting the Malaysian state on the Amateur Radio map. 9M8STA was operated from the evening of August 4 until the morning of August 7. At the same time, arrangements were made for Yoshi Hayashi, JA1UT, to carry out 50-MHz propagation tests from Kuching. Yoshi had previously carried out 50-MHz propagation tests from Singapore and Trengganu (peninsular Malaysia).

The 9M2 group arrived at the Holiday Inn with 22 packages of equipment and immediately proceeded to set up a triband beam, VHF/UHF antennas, an all-band collinear antenna, two stations for operating HF CW, SSB, AMTOR and packet, and a satellite station.

The station was declared open by the Minister of Environment and Tourism the Honorable YB Datuk Amar James Wong Kim Min. The Director General of Telecommunications of Malaysia Tuan Hj Mold Ali Yusoff flew in from Kuala

Lumpur to attend the ceremony and stayed for the duration of the operation. Local senior officers of his department in Kuching were also present for the opening ceremony and showed a keen interest in the station operation. IARU Region III Director D. D. Devan, 9M2DD, attended the event on the invitation of the Sarawak Tourist Association as a representative of the Region III Association.

The event was an unqualified success, with the dedicated 9M2 hams operating in shifts throughout the day and night, making a total of 3039 contacts in 80 countries. JA1UT's 6-meter propagation tests were also very successful with over 300 contacts being established by the morning of August 7, with further tests scheduled through the following week.

From conversations with the Minister of Tourism and Environment and other Sarawak officials, it was obvious that they had little previous information on Amateur Radio until they witnessed the 9M8STA operation. Some of them thought that Amateur Radio was a clandestine affair, and one had thought that the special-event station was to be something of a "disk-jockey" job. In my opinion, the operation

of the special-event station enlightened the Sarawak officials to the potential of Amateur Radio and the desirability of its further promotion—not only from the tourist angle, but also in developing much-in-demand technical knowledge. Favorable reports of the event were reported in local newspapers.

At a dinner hosted by the Sarawak Tourist Association, D. D. Devan, 9M2DD, spoke to the audience about the IARU, the ITU, their respective functions and roles, the limited resource of radio spectrum and how pleased he and Chairman of IARU Region III David Rankin, were with special-event station 9M8STA. —D. D. Devan, 9M2DD, Director, IARU Region III Association



(l-r) IARU Region III Director D. D. Devan, 9M2DD; Director General of Telecommunications of Malaysia Tuan Hj Mold Ali Yusoff; Minister of Environment and Tourism the Hon YB Datuk Amar James Wong Kim Min; Malaysian Amateur Radio Transmitters' Society President Lee Fook Seng, 9M2LF; and Regional Manager of Malaysian Airlines Encik Abdul Aziz at the opening ceremony for special-event station 9M8STA, which promoted Amateur Radio in Sarawak.



Mr Pekka Tarjanne, most recently the Director General of Finnish Post and Telecommunications, was chosen by the Plenipotentiary Conference of the International Telecommunication Union in Nice to serve as Secretary-General of the ITU. Although not a licensed amateur himself, Mr Targanne is well acquainted with Amateur Radio and has already indicated a desire to work cooperatively with the IARU. (photo Tapio Mustasaari)

Silent Keys

Administered by Nancy A. Slipski

It is with deep regret that we record the passing of these amateurs:

WA1CPX, Robert V. Jenks, Pascoag, RI
 W1CWW, W. A. Searle, Jr., Worcester, MA
 W1IEF, Edmund I. Elgart, Longmeadow, MA
 KA1MK, Elinor P. Pingree, Duxbury, MA
 WA1OPT, Laurence F. Cleveland, Newtonville, MA
 *AB1R, Francis H. Morrison, Enfield, CT
 W1ZYQ, Henry Leveille, Leicester, MA
 KA2BSY, Edward L. Spear, Smithtown, NY
 K2EUU, Ida S. Wexler, Islip, NY
 WA2FCI, Barnard Simmons, Pepperell, MA
 W2JUH, Donald C. Delalla, Cutchogue, NY
 K2KVR, Joseph Nagy, Edison, NJ
 W2UAL, Robert E. Graves, Albertson, NY
 W2UWD, Robert D. Turrell, Binghamton, NY
 WA3BOH, Arnold I. Littman, Pittsburgh, PA
 N3DKD, Homer C. Grasberger, Philadelphia, PA
 K130, John W. Harrell, Sharon, PA
 KA3ORJ, Raymond R. Ramson, Bethlehem, PA
 W3YNK, Gilbert L. Foster, Temple Hills, MD
 WB4EKP, Butch Howard, Tampa, FL
 **W4EWR, Philip Ewald, Knoxville, TN
 WD4FOB, Frederick A. Aebie, Brooksville, FL
 KC4FZW, Carl C. Carhart, Catlettsburg, KY
 K4GBQ, Herschel E. Peters, Ringgold, GA
 K4GGP, James T. McKenzie, Camden, SC
 N4HWH, Charlie W. West, Jr., Manchester, TN
 K4ITA, Carl R. Hibshman, Ocala, FL
 KB4JBI, Arthur W. Luce Jr., Palm Harbor, FL
 W4LKP, Craig R. Woodward, Bowling Green, VA
 W4LRC, Clarence N. Quinlan, Jr., Fort Walton Beach, FL
 W4NDY, Edward A. Strode, Winchester, KY
 WD4NGR, Lou E. Eigher, Jr., Bay Pines, FL
 WA0CZ, M. Dale Redlingshafer, Rio Rancho, NM
 WB4PIC, Herman E. Denzin, Floral City, FL
 W4PUK, Paul R. Smith, Orlando, FL
 N4QPS, John R. Clore, Louisville, KY
 WA4SJV, Hugh A. Russell, Newport, TN
 K4SMN, E. F. Mattison, Clearwater, FL
 W4STC, Robert L. Nowell, Tampa, FL
 W4TN, Harvey J. Crane, Big Pine Key, FL
 W4TXQ, Roy A. Edmonds, Springville, TN
 KB4VJG, Tommy Tucker, Osprey, FL
 W4WYY, Myrtle B. Johnson, Baxter, KY
 N5ALW, Harold L. Hardy, Sanger, TX
 WA5CUJ, Lawrence L. Johnsey, Lawton, OK

W5DAD, Alva R. Wilson, Roswell, NM
 N5GCD, Edward J. Cash, San Antonio, TX
 W5GWI, Warren V. Elrod, Albuquerque, NM
 KE5ID, Ben H. Julian, Mesquite, TX
 N5LRS, Donald A. Donovan, New Roads, LA
 W5MGR, Clayton C. McFadin, Sr., McComb, MS
 WA5VWG, Edmund M. Snyder, Jr., Houston, TX
 K5YVO, Robert E. Kale, Conchas Dam, NM
 KB5Z, A. T. Ray, Austin, TX
 KA5ZWW, William E. Thurner, Meridian, MS
 W6AIX, Albert E. Wolfe, Lancaster, CA
 WA6CUH, Michael Downs, Riverside, CA
 W6DNY, Virgil J. McCluskey, Napa, CA
 W6EBL, F. E. Robinson, Sonoma, CA
 N6HAB, Harold W. Annis, Daly City, CA
 KA6HBR, Boyd U. Holifield, Apple Valley, CA
 K6PGE, John E. Donnelly, Valley Center, CA
 WB6RKE, Earl S. Raybourn, Fresno, CA
 W6UAP, Frederick W. Young, San Marcos, CA
 KD6UF, William B. Crum, Woodland Hills, CA
 K7CTN, R. F. Hemenway, Vancouver, WA
 WB7DQB, Robert O. Simpson, Chehalis, WA
 W7JMJ, Dave E. Carter, Ashland, OR
 WBTN, Derald D. Dion, Moscow, ID
 KE7ZX, Robert L. Schenk, Liberty Lake, WA
 N8AET, Arthur W. Grant, Detroit, MI
 W8CGP, Charles A. Vimmerstedt, Youngstown, OH
 *KC8C, Michael W. Colesante, Temple Hills, MD
 KB8DED, Vernon C. Cowfer, Akron, OH
 W8LK, Donald F. Alexander, Dayton, OH
 KC8OF, William C. Goggin, Midland, MI
 W8QQV, Francis D. Gilliland, South Euclid, OH
 W8PVB, Joseph L. Hassett, Rogers City, MI
 W8SYC, Clinton W. Flowers, Piqua, OH
 W8VJX, Robert Lyman, Mentor, OH
 KO8X, Donald J. Barnes, Wheeling, WV
 *W9AMO, Herbert Pascal, Chicago, IL
 WD9EEX, L. E. Westbrook, Northbrook, IL
 KA9FLJ, Walter J. Norman, Mountain Home, AR
 W9GAK, John Chopper, Chicago, IL
 WB9GX, H. J. Reed, Elkhart, IN
 W9NGG, Harvey C. Lugar, Pontiac, IL
 KA9OSX, Ron Thune, Green Bay, WI
 W9RDW, James R. Oliver, Wabash, IN
 W9TKD, Walter C. Wisnowski, Chicago, IL
 W9WF, Willis F. Eleam, Metropolis, IL

K9ZHZ, Everette S. Oliver, Danville, IL
 W0BDZ, Owen Hill, Marshalltown, IA
 W0BOE, L. H. Estes, Marble Hill, MO
 N0CDA, Jack E. Randall, Nathrop, CO
 WB0GIM, Marshall D. Hoffman, Pueblo, CO
 W0HDX, Lawrence A. Peterson, Marion, IA
 K0HJY, F. Louis Bald, McCook, NE
 N0HKX, Wayne Maxfield, Wichita, KS
 W0HYC, F. Earle Webb, Lucerne Valley, CA
 KD0KL, Audrey Kimpe, Mankato, MN
 W0OTP, Lee F. Wilson, Hardy, IA
 W0GHY, James H. Wilson, Webster Groves, MO
 K0SEV, Robert W. Green, Sioux City, IA
 W0YAE, John E. Dean, Fort Collins, CO
 W0ZN, Maynard C. Mielitz, Fort Dodge, IA
 LU1EKM, Alan A. Campbell, Buenos Aires, Argentina

*Life Member, ARRL

**Charter Life Member, ARRL

Notes: All Silent Key reports sent to HQ must include the name, address and call sign of the reporter as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in QST.

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from HQ. Canadian reports should be sent to the CRRL HQ address on page 9.

Many hams have remembered a Silent Key with a memorial contribution to the ARRL Foundation. Should you wish to make a contribution in a friend or relative's memory, you might designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund or for the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation, Inc., 225 Main St., Newington, CT 06111.

50 Years Ago

November, 1939

- Early Washington jitters about communication security, prompted by the war in Europe, have somewhat subsided; the Editor says if we behave ourselves, it is likely we can stay on the air.
- Five-meter enthusiast W2DKJ applied the principles of the extended double Zepp antenna to 56-Mc. radiator construction, and found (with some modifications) considerable improvement over most antennas currently in use on that band. It was outstanding also in use at W2USA, the N.Y. World's Fair station.
- Broadcast station WTIC has an experimental transmitter W1XEH on 63.5 Mc. to follow up on the late Ross Hull's investigation of air-mass bending of u.h.f. waves. The novel stacked coaxial radiator, four in-phase elements of downspouting, is described for us.
- The recent League poll of amateur views as to whether 7200-7300 kc. should be opened to 'phone work (in the event this step was necessary to enable us to combat foreign broadcast interference) showed that 82% of the replies favored such a course.
- W6AJF and W2DIY relate the advantages of cathode modulation (once known as "center-tap modulation"), particularly that it requires only one-fifth the power needed for plate modulation, and still is 50 to 60 percent efficient.
- The League-sponsored u.h.f. relay and field day, held in September, brought enthusiastic participation; the record relay was New York to Chicago, passing through ten stations—all on 56 Mc.
- The idea of ganging a variable inductance and

a variable condenser is not new, but seldom has been applied to amateur transmitters. W1LJI describes a single-control tank circuit covering three bands with a constant L/C ratio, yet without switches.

- W5EME has a three-element beam with continuous rotation in either direction; he uses 1/4-inch copper tubing coils to provide inductive coupling.
- The Radio Corporation of America, wisely aware that many amateurs run transmitting tubes well over the published power ratings without excessive damage, is now using two sets of maximum ratings. One is "continuous commercial service," where the figures for each tube will not be changed; the second and new class is "intermittent commercial and amateur service," with higher ratings, providing a relatively large increase in useful power output.

25 Years Ago

November, 1964

- The Editor blows the League's horn a bit, reciting some of the ARRL-sponsored achievements of recent years—e.g., expanded 160-meter privileges, a new Hq., a commemorative postage stamp, a reciprocal-licensing bill, expanded power on 420 Mc., to name a few.
- Many Novices, frustrated by no contacts, eventually find that mistuning has caused them to transmit on one band but listen on another! W1ICP draws on the old, familiar absorption wavemeter to design a gadget which will avoid the problem.
- A "featherweight portable station for 50 Mc.," designed by W1HDQ, weighs less than three pounds, including power supply, microphone and

a good antenna system; the secret is transistors, of course, which provided 1000 miles per watt.

- K5JVF used a standard telescoping TV mast for a full quarter wavelength vertical on 80 meters, mounting it on a king-size pop bottle.
- Directional couplers are pretty useful indicators for s.w.r. measurement, but K1PLP points out they are not precision instruments; e.g., the crystal diode rectifying a small portion of r.f. has enough resistance to cause some error in the meter reading.
- An amateur applicant living more than 75 miles from an examining point may take his exam by mail, but FCC is concerned about the recent growth in the percentage of these Conditional Class licensees and so proposes to adopt a new distance figure of 175 miles.
- The 50-year anniversary section highlights the late 50s, in particular the 1959 international radio conference in Geneva, Switzerland, where after resisting heavy foreign attacks we retained all U.S. privileges; however, amateurs elsewhere received more cuts at 7 Mc. because of inroads by broadcasters.
- If you bought (or received through MARS) one of the thousands of surplus I-177 tube checkers, K4YPY shows how it can be modified to provide an up-to-date unit at minimum cost.
- A "12-volt" transistor is not always immune to damage just because your power supply is 12 volts or less; W1CUT points out that in an audio amplifier, for example, the audio voltage adds to the d.c. component and may double the rated figure.
- In an article bound to stimulate discussion, K4KXR (by profession an equipment manufacturer, natch!) argues that building your own is a waste of time and money in these days of complicated electronic construction procedures, requiring specialized tools and sophisticated measuring and test equipment.—W1RW

Field Day 1989

By Billy Lunt, KR1R

Contest Manager

and

Mark R. Burke, KA1MIS

Contest Assistant

On the weekend of June 24-25, Field Day stations could be found most anywhere: in meadows, on hilltops, snuggled in public parks, in backyards, at shopping centers and just about any other imaginable place. FD is fast paced and exciting. At the drop of the green flag (1800Z Saturday), the fun began with transmitters blazing with CW, SSB, packet, RTTY, FM, slow scan, AM and any other mode you can think of. This pace continued for 24 straight hours (27 if you waited till the start to set up). Even though the pace may be grueling at times, FD operators find time to enjoy themselves. George, WD4CYV, informed us that their "operation was nearly continuous, except for a watermelon break financed by club president, W4SFF." Little interruptions such as that can strengthen club ties and boost morale while not diverting from the overall goal—to win! This is what Field Day is all about. FD hones our skills in portable station emergency communications by placing us in less than optimum conditions. It provides us with a competitive atmosphere, but at the same time, fun times for all.

Field Day can attract a lot of visitors. It is a good idea to set up a visitors booth with hand outs, manned by a few good public relations people to help explain your club's operation. This extra activity can earn your FD group bonus points. Mike, WN2A, noticed that "being located at the town's municipal building brought in a steady stream of onlookers." Frank, NG1I, was "surprised at the number of non-Field-Day hams and nonhams who constantly stopped by to view our station and ask questions." To those curious visitors who just happened by, all those unfamiliar sounding noises and messages being exchanged must seem mighty strange without the public relations people explaining what FD and Amateur Radio is all about.

Field Day participation keeps on growing! During Field Day '89, a reported total of 28,701 people headed to their favorite FD spots and set up 1742 sites—up slightly from the 1988 figures. Continuing the trend, SSB was the favorite mode during Field Day again this year. There were 895,936 phone QSOs reported and 465,922 CW QSOs for a grand total of 1.3 million contacts. When the Contest Branch finished tallying all the claimed



NK1I and N1FJ operated in the 1B 2 op battery category from this remote mountaintop location.

Entries per Field Day Class

1A — 249	3C — 1	7A — 16
1B1 — 65	3D — 4	8A — 17
1B2 — 64	3E — 6	9A — 6
1C — 29	4A — 107	10A — 6
1D — 92	4C — 1	11A — 3
1E — 74	4D — 1	12A — 1
2A — 532	4E — 1	13A — 1
2B1 — 1	5A — 65	15A — 1
2B2 — 20	5B2 — 1	17A — 1
2C — 1	5D — 1	23A — 1
2D — 9	6A — 42	24A — 1
2E — 16	6D — 1	
3A — 304		
3B1 — 1		

Top Scoring Stations

Call	Score	Entry Class
K5DX	25,260	23A Battery
K6CAB	23,685	17A Battery
N1NH	20,810	15A Battery
K0NA	18,265	3A Battery
KS3L	16,805	3A Battery
W2GD	15,430	4A
W1NY	15,100	9A
N6ME	14,772	8A
KR0B	13,975	2E
N6AW	13,670	3A

bonus points, there was a total of 847k bonus points credited, making the total score earned by all entries over 4.7 million points. Not bad at all!

Field Day is an emergency preparedness exercise, with emphasis placed on setting up temporary stations in a minimum of time for emergency communications. Of the 1742 FD

stations, 1698 of them ran 100% emergency power. There were 1563 Generator-powered stations and 135 battery powered. Amateur Radio has again met its goal for providing temporary powered stations practicing emergency communications.

The 2A entry class was the favorite entry category again with 532 entries. The second most popular class was 3A with 304 entries. Check the boxes for further breakdowns and information for your group's plans in preparing for the 1990 Field Day.

Comments from several groups are listed below. You can get comparison information or ideas for revamping your group's next FD effort. See you next June 23-24 during Field Day 1990.

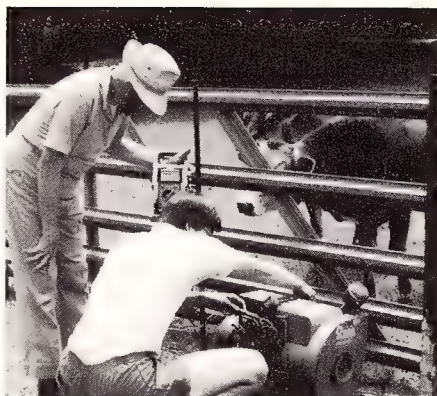
SOAPBOX

VE6FD, 1A

Saturday morning dawned bright and clear and found me outside my tent trying to build, single-handedly, a 4-element, 40-meter wire LPDA. VE6VQ rolled in about 10:00 AM and began erecting supports. The effort involved caused him to retire to my tent and spend the rest of the day producing loud, irregular, snoring noises. He later claimed these were merely a new type of ultra-low-frequency packet.

VE6KEY dropped by, accompanied by his wife and two Doberman pinschers. He tried his hand at making his first-ever phone QSOs, while the dogs tried to catch squirrels. It should be noted that in spite of several valiant canine attempts at tree climbing, the squirrels remained unmolested.

For the rest of the time, we operated, ate, drank, drank, ate, chased beavers away from the antenna



Centralina ARC, N4QR claims the cows participated in Field Day '89, but they were not included in the "head count."



Three of the ops of the W2TZ group making phone QSOs.

supports, operated and listened to VE6VQ snore. The LPDA worked fine—we made two whole contacts with it, and then reverted to our normal 20-meter habitat. Needless to say, we did nothing special for points this year, but, as usual, a fine time was had by all.

AA5EQ, 1B—2 operators

FD '89 was a "kinder and gentler" experience than that of last year. We didn't get hit by any severe weather, and the insect attacks were minor. We had no equipment problems either. The only negative things that happened were two "raids" by the local police who thought we were running a still, and my partner's bug gun. Alan, KB5CUS, had brought along a squirrel cage fan to run off the generator. He had it aimed at the operating position to help counter the heat and humidity. It did a good job at providing a breeze, but it also made a very effective shredder and launcher for June bugs. I would duck every time I heard a June bug rattle into the fan. You had about a second before the inevitable spray of bug parts would come whistling at the mike.

In retrospect, we should have set up an information booth. We could have easily picked up some bonus points from the continuous stream of passersby who wanted to see what we were doing, not to mention the half-dozen police who came by. It wasn't a total waste to be sure. A local teenager came by several times and spent hours watching and asking questions. Later, I got a phone call from him. It seems he got charged-up by the experience and ran out and got one of those Novice class kits. He studied it and passed the test. In a few weeks, he will have his ticket and be on the air. He called me to volunteer to help us next FD!

W5QX, 2A

Field Day 1989 started off hot for the San Angelo ARC. In fact, things got hot before competition even began!

Charles, K5JEZ, while transporting one of the club's generators to the site, was flagged down by a passing motorist and told the trailer was on fire. Sure enough, it took all the drinking water K5JEZ and the motorist had to extinguish the flames. An oversized tire rubbing against the trailer frame was the culprit. The generator, dubbed the "Africa Queen," remained undamaged and performed beautifully.

The operators got off to a blazing start. However, the heat would have been more intense if the SSB station had realized it was attempting to operate 20 meters from the 40-meter dipole. Once corrected, a great FD began to fall into place—or out of place.

While Noel, KE5NO, was taking part in an on-camera, television interview, explaining how technical expertise contributes greatly to the total points, the primary generator died due to fuel pump failure. An auxiliary generator was pressed into service, and the CW station was operational again.

With Murphy and a host of gremlins exorcised, initial butterflies removed from the operators' stomachs, and a solid cloud cover to keep the Old Sol away, we began to generate points. At the end of the 24 hours, more than 3000 contacts had been made, each station setting a new club record. And for the first time in the history of SAARC, not one of the 40 participants said, "Never again!"

N1GKJ, 2A

It was a most enjoyable weekend for the three of us indeed. Operating with Technician privileges only made for some slim times in the middle of the night. It was most discouraging that 10 meters did not open up for Saturday evening. But our location at Good Hill Airport, 1000 feet above sea level, made for many nice ground-wave contacts, the longest of which was a contact with KA1STB in Gay Head, Massachusetts—a distance of about 130 miles.

The evening did provide us with some laughs too.

Our contact with N1FOJ, a 2A station in New Hampshire, was a lesson in perseverance. It took too many repetitions of our various information to count because of the weak signals of our stations. Finally after at least 5 minutes and a lot of yelling, we were able to exchange all the required information, at which time everyone in our tent let out a big yell. I'm sure that everyone in New Hampshire was pretty happy too.

We all had a very good time talking with the people that stopped by. Most were very interested in the whole concept. I know that all of us here are looking forward to it again next year. Of course, next year we should at least have General class privileges, and we will probably start to organize the whole thing more than four days in advance. Thank you, and we'll see you next year.

N8IAO, 3C

This year was probably one of the most offbeat stations assembled. N8ITP and myself held FD aboard a 28-foot sailboat. However, before nightfall, we had to return to the dock. That is when the fun really began. After talking to WD8OCS and N8CDN on 2-meter simplex, we found ourselves hosting quite a little party. Before it was over, KC2FQ, KA8PMI, N8JBI and several nonhams participated. Overall participation included operators, crew members—even the security guard at the marina helped out for a few minutes! I was very surprised how many people from the marina came over to see what was going on and showed an interest in ham radio. We also managed to get some prospective Novices lined up for an upcoming class.

We may not have set a record in the point standings, but I'll challenge anyone to beat the fun we had!

WG7X, 4A

Well, we came, we saw, but we didn't conquer—not by a long shot, but we did have fun. This was the second time that we had gone out for FD using my call. The year before, we had not put out a big effort. This year was different.

Randy, N7HNX, put forward a tremendous effort as our equipment chairman. He put up an antenna farm that would be the envy of many a ham. We had a better setup for FD than many of us have at home! We all learned a lot about the fine art of tower raising from Randy. He really had that situation under control.

We just barely got the 20-meter station operating in time for the contest start. We were only an hour late! We then concentrated on the 10- and 15-meter station. We got everything working, and it only took us a day and a half! Then, Murphy attacked the rotator. Some frantic trouble shooting ensued, and the problem resolved in record time. We really got some exercise running up and down a 35-foot tower. The locking pliers saved the day!

Feedback

Please refer to November 1988 QST, pp 79-87, for the following corrections. In 2A, W8SP should have had 6,914 points instead of 6,804. Also in 2A, N5RR's line score should have read 2989-2-10-9,152, not 4216-2-10-14,060.

Scores

Class A stations are clubs or groups operating with more than two operators. Score listings are grouped according to the number of transmitters in simultaneous operation. The listings show club or group name, call(s) used, total number of QSOs, number indicating power output used (5 is less than 5 W; 2 is less than 150 W; 1 is more than 150 W), number of participants and total score including bonus points. Scores are listed from highest to lowest in each class. Non-club groups are identified by the letters "NCG." Class B stations are portables manned by one or two operators. These may have one or two transmitters in simultaneous operation. Class 1B stations manned by one operator are listed first, followed by those with two operators, followed by Class 2B stations. When there are two operators, the other operator's call is listed in parentheses, if it is known. Numbers following the calls indicate QSOs, power and final score. Class C stations are mobiles. They are listed by call, QSOs, power, number of operators and final score. Class D stations are home stations using commercial power. Line scores are the same as Class C. Class E stations are home stations using emergency power. Line scores are the same as Class C.

Club/Non-Club Portable 1A Battery

Panama City ARC	
W4RYZ	1278- 5- 30- 9,335
Dinosaur Valley DX Soc	
K5MW	630- 5- 10- 6,835

Callaway ARL	
K5SM	569- 5- 12- 6,550
Spectrum First	
ND7A	672- 5- 3- 6,265
NCG	
WB6ITM	635- 5- 5- 6,030
Central NC DX Chasers	
N4DAZ	648- 5- 8- 6,010
University ARC	
KU7D	598- 5- 14- 5,020

Central MO RA	
ND0N	358- 5- 9- 4,180
Real Studs	
K2RS	491- 5- 3- 4,115
Hiawatha & Falls City ARCs	
W0PB	467- 5- 21- 3,960
NCG	
W9VV	321- 5- 4- 3,610
Davis Co ARC 1	
NS7K	297- 5- 58- 3,610

KC QRP	
N88A	317- 5- 11- 3,585
RCA ARC	
N9RJ	469- 5- 15- 3,455
UM des Sans-filistes de Montreal	
VE2UMS	280- 5- 20- 3,300
Steuville-Weirton ARC	
KE8SX	285- 5- 30- 3,050
Lookout Mountain QRPers	
KA4LKH	423- 5- 6- 3,050

Lightning Arrestors	260-	5-	3-	2,700	Murphy's Law-Yers	862-	2-	6-	2,382	Indianapolis Power & Light ARC	494-	2-	8-	1,384	Grand Strand ARC	268-	2-	8-	636	Arlington ARC	2704-	2-	57-	8,434
KCSZT					N6JF					NTTT					WD4JMT					KSSLD (+N5HAJ)				
NCG					North Jersey DX Assn	568-	2-	3-	2,372	Mason Co RC	448-	2-	27-	1,372	Confluence FDG	256-	2-	10-	612	Escondido ARS	2780-	2-	20-	8,422
NBA					NA2R					K8DXF					N9DLB					N6NB (+N6N)				
Thumb ARC	328-	5-	5-	2,555	Honor of America RC	640-	2-	15-	2,352	Uniontown ARC	405-	2-	7-	1,370	Dixie City DX Bandits	100-	2-	4-	610	Albuquerque DX Assn	2775-	2-	19-	8,596
WBAX					W8RR					W3PIE					AB4KA					N5RR (+N5GFR)	2497-	2-	8-	7,322
ORP Electron Squirrels	255-	5-	3-	2,455	Case ARC	484-	2-	3-	2,236	Pioneer ARC	464-	2-	20-	1,366	Hastings RC	65-	2-	4-	570	Radio Amateur Technical Soc	2497-	2-	8-	7,322
WB8VGE					W8EDU					VE3NA					N8FKC					AJ9D (+K9TZZ)				
U of S ARC	202-	5-	11-	2,305	Silicon Gulch ARC	2008-	1-	6-	2,208	Sand Hills ARC	478-	2-	20-	1,356	Cornell University ARC	203-	2-	4-	556	Delaware ARC	1797-	2-	26-	7,300
VEUS					AEGC					W8MI					W2CXB					W2QLS (+K88ENJ)				
North Texas Frequency Assn	295-	5-	15-	2,275	Honolulu ARC	969-	2-	20-	1,918	Augusta ARC	373-	2-	22-	1,336	Capilla Peak FDG	439-	1-	7-	539	Owensboro ARC	2145-	2-	30-	7,158
NOEX					KH4SO					W1TLC					K5FSB					K4HY (+N4PHW)				
Bloated Toads	254-	5-	3-	1,705	Summer Co ARC	692-	2-	12-	1,916	Yucaipa Valley ARC	566-	2-	10-	1,332	Coon Valley ARC	167-	2-	15-	534	Campbell Co ARC	2047-	2-	8-	6,928
AC7A					K4DZR					W6CV					KV8N					W67M (+N7MKW)				
Carbon ARC	204-	5-	7-	1,345	Just Three Hamsters	838-	2-	3-	2,166	West Alabama ARS	515-	2-	25-	1,330	Sand Hill Fleas	104-	2-	14-	516	Mountaineer ARC	2096-	2-	22-	6,858
N3IK					W47LNV					K4GGS					W45IS					W8SP (+K8AVQ)				
Windy City Chaverm	6-	5-	10-	260	Hallon ARC	631-	2-	15-	2,120	Eastern Oregon RC	463-	2-	7-	1,326	Mara Lexington Group	157-	2-	3-	514	Satellite ARC	2447-	2-	12-	6,856
W5ZDK					W40D					W7WNY					N4AHA					W6AB (+N6TME)				
					Hawk Mt Skunks	759-	2-	4-	2,102	Silver City ARF	273-	2-	6-	1,308	Neshoba ARC	145-	2-	6-	496	N KY RC	2169-	2-	9-	6,804
					W44YGG					N5BKW					W5GI					NM4A (+K8BGLU)	2169-	2-	9-	6,804
					Columbia ARC	725-	2-	8-	2,070	Scioto ARC	402-	2-	5-	1,308	Koolau ARC	91-	2-	15-	494	San Jose State Univ ARC	2177-	2-	15-	6,684
					K3EF					K3SO					B5BARTSS					Serious Hams ARC	2459-	2-	14-	6,648
					South Florida Hamsters	714-	2-	20-	2,068	Spilock ARC	897-	1-	25-	1,297	WD4EQ	161-	2-	5-	482	Ham Assn of Mesquite	1911-	2-	27-	6,614
					North Shore ARC	446-	2-	16-	2,066	W2K2R					WABACX					KE5ID (+N5AIB)				
					VE7NSR					VE3LRO					New Era Repeater Technocrats	147-	2-	4-	476	Ohio Valley ARC	2189-	2-	9-	6,606
					Tamaqua TS	475-	2-	5-	2,062	Hoffman Estates ESDA	379-	2-	6-	1,288	W6DAS	136-	2-	3-	472	Daytona Beach ARC	1949-	2-	30-	6,552
					W3TI					W9NIC					Palmer Valley ARC	129-	2-	6-	458	Halifax ARC	1896-	2-	30-	6,506
					GA Tech ARC	568-	2-	10-	2,046	Lehigh Valley DX Assn	332-	2-	4-	1,236	K7NV					N8MU (+N8JCP)	1974-	2-	20-	6,412
					W4AOL					K3SY					C7N					K9AW (+K9TEP)	2023-	2-	11-	6,412
					Denton Co ARC	502-	2-	20-	2,042	Prince Rupert ARC	464-	2-	5-	1,228	VE3AOY	224-	2-	8-	448	Tri Co ARC	1893-	2-	4-	6,214
					W5NGU					VE7EE					Lockheed ARC	155-	2-	3-	416	Providence RA	2167-	2-	15-	6,076
					LL's	964-	2-	5-	2,028	Last Mountain RC	372-	2-	8-	1,216	W6GFF	133-	2-	8-	360	Motor City ARC	1828-	2-	60-	6,070
					N5LLK					VE5LM					Cleanwater Valley ARC	119-	2-	6-	338	Muncie ACS	1692-	2-	10-	6,028
					K4SOI					K9MBB					KE7RT					W6CF (+N6BPE)	1917-	2-	20-	6,028
					VE2CVC					Eastern Nevada ARS	552-	2-	6-	1,204	W7VLS	792-	2-	8-	1,764	Big Bend ARC	1920-	2-	17-	6,024
					Althens RC	524-	2-	14-	1,994	W87WTS					White River Valley ARS	87-	2-	7-	274	NARS	1917-	2-	61-	6,016
					NB4X					New Cuyama Quad Hoppers	295-	2-	3-	1,196	N8OST					N5FD (+K8SEYR)	1917-	2-	61-	6,016
					Reno Co ARC	600-	2-	10-	1,966	Cargolina ARC	298-	2-	43-	1,190	W7VLG	79-	2-	7-	258	K3PZN (+K3PRG)	1930-	2-	25-	6,006
					W8UY					Southern CA Amateur Network	579-	2-	6-	1,184	K2ZZ	33-	2-	7-	166	W8XD (+N8DDM)	1949-	2-	25-	5,962
					N8G					LARC					IN Lakeshore Amateur Burmots	1202-	1-	6-	1,402	Southwest Missouri ARC	1891-	2-	74-	5,960
					Heligate ARC	726-	2-	4-	1,940	K7MP					N9J					W8EBE (+N8N)	1891-	2-	74-	5,960
					NZ7M					South Lyon Area ARC	390-	2-	5-	1,166	W7VLS					Green Mountain Wireless Soc	1906-	2-	20-	5,910
					Worldradio Staff ARC	766-	2-	25-	1,936	Shiawassee ARC	265-	2-	4-	1,160	W1GGA					Kingsport ARC	1539-	2-	30-	5,848
					N6WR					Shiawassee ARC	265-	2-	4-	1,160	W1GGA					W5KA (+W5AAH/S)	1842-	2-	25-	5,836
					Southern Ohio ARC	766-	2-	25-	1,936	Oak Park ARC	464-	2-	12-	1,128	W4E0G					Syosset HS Alumni	2172-	2-	8-	5,826
					ARA of SW Florida	711-	2-	21-	1,922	W8MB					S Port Is FD Marching & Chowder Soc	382-	1-	5-	687	Falmouth ARC	1815-	2-	35-	5,796
					K4FA					Lakes Area ARC	425-	2-	7-	1,110	W1GGA					K3SA (+K3MCC)	1781-	2-	18-	5,776
					N3GIL					W8FGL					Massillon ARC	1000-	5-	25-	10,140	Boulder Park Group	1819-	2-	9-	5,744
					Kauai ARC	1190-	1-	38-	1,890	Anaconda ARC	449-	2-	35-	1,098	W8NP (+K8BAKD)	858-	5-	21-	7,265	STT/STJ ARCS & VIARC	1659-	2-	19-	5,718
					KH6LG					W7VNE					Maryland Mobiles ARC	761-	5-	16-	7,170	Antelope Valley ARC	1702-	2-	20-	5,712
					Cumberland ERG	790-	2-	12-	1,880	NCG					W8NP (+K8BAKD)	858-	5-	21-	7,265	Suburban Cincinnati ARS	1630-	2-	25-	5,684
					VE3CER					K4BYUP					W8NP (+K8BAKD)	858-	5-	21-	7,265	St Louis ARC	1508-	2-	20-	5,672
					Northern Illinois RA	524-	2-	5-	1,876	Platexill Irregulars	378-	2-	3-	1,066	W8NP (+K8BAKD)	858-	5-	21-	7,265	Cape Fear ARS	1625-	2-	52-	5,664
					KE5JH					W7JIE					W8NP (+K8BAKD)	858-	5-	21-	7,265	K4MNM (+N4UGH)	1657-	2-	52-	5,664
					Kennedy Key Clicks	424-	2-	4-	1,866	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	Loveland RA	1625-	2-	52-	5,664
					Medina Two-Meter Group	410-	2-	6-	1,858	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	Mid-Mo ARC	1590-	2-	20-	5,528
					K8TV					Woodchuck ARC	810-	2-	11-	1,820	W8NP (+K8BAKD)	858-	5-	21-	7,265	Norwood ARC	1412-	2-	20-	5,516
					NBDKQ					Novatel ARC	515-	2-	5-	1,790	W8NP (+K8BAKD)	858-	5-	21-	7,265	VARA/MARA	1653-	2-	63-	5,466
					Novatel ARC	515-	2-	5-	1,790	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	W4QO (+N4TMMW)	1397-	2-	40-	5,460
					W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	Elgin ARS	1534-	2-	15-	5,434
					W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	Rocky Mt Wilson ARS	1632-	2-	23-	5,430
					W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	NE4J (+W4ATJC)	1645-	2-	23-	5,430
					W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	Gallop Gulch Gang	1632-	2-	23-	5,430
					W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	N6LL (+N6JVVH)	1645-	2-	23-	5,430
					W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	Williamsburg Area ARC	1504-	2-	25-	5,426
					W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	K4MU (+W4JYC)	1504-	2-	25-	5,426
					W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	Fairfield ARC	1486-	2-	27-	5,412
					W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	NVID (+K4TFM)	1486-	2-	27-	5,412
					W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	Limestone ARS	1821-	2-	30-	5,324
					W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	AB4KC (+N4TXP)	1821-	2-	30-	5,324
					W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-	7,265	Farout ARC	1585-	2-	33-	5,256
					W8NP (+K8BAKD)	858-	5-	21-	7,265	W8NP (+K8BAKD)	858-	5-	21-											

Brazosport ARC WB5J (+K45COA) Saline Co ARC K5NE (+K85JG) Union Co ARS WK4S (+N4QIN) Rockwell Automatics RC K16X (+K8BEID) Cedar Valley ARC WBQO (+N8BJK) Fauquier ARC N24N (+K4KUD) Northwest Illinois ARC W9AF (+K4JAX) ARA of Southern New England W1AQ Spartanburg ARC K4II (+N4TIR) South Carroll ARC W3FCR (+K43NNR) Charleston ARS W4AUSN (+K4BADF) Calumet ARES KN9P (+N8HNN) Decatur ARC W4ATD (+W4ANQP) CRA Vallee Du Richelieu VE2CVR Tucson IBM ARC W07F Metropolitan ARC—Little Rock AF5M (+N5OOQ) Blue Ridge RS AC4Q (+N4TTY) Stockton-Delta ARC W6SF (+N6VHJ) Beaches ARS WU4R (+K4CAPJ) Florida Free Southampton NR2L (+W82KD) Pikes Peak RA W4WYU (+N8JUF) Hollister Hams KG6GF (+K8BKTZ) SVARA K8DAX (+K8BDXE) Mountain ARC W1BJW (+N8HNN) Texins ARS K4WRP Amateur Radio Caravan Club W45Y (+N5JUG) Amateur Radio Transmuting Society W4CN (+K4BWEW) West Texas ARC N5ETX (+K85E0F) Claremont RA WM6J (+N6LLK) Pioneer ARC AA4HF Granite State Hill-Toppers AF1T ARINC ARC W3ZH (+K43TOI) Northern Chautauque ARC W2SB (+N2HTE) East Passo ARS K14JW Tri-Co Ham RC N8CG (+K4ZMF) Northwest Arkansas ARS K1W5G (+K85JX) Bartlesville ARC W5NS Cowichan Valley ARC VE7CVA Bullitt ARS AA4KH (+K44TEV) East Bay ARC W6CUS (+N6VLV) West Virginia AR NK8Y (+N8GZA) Metro DX Club W0CR Royal Canadian Mounted Police ARC VE3RCMP Suburban RC W0DCW (+K88EAT) Yellowstone RC K7EFA (+K87HKA) Shy-Way ARC W7NE (+N7JPR) Tyler ARC AA5AA (+N5LVN) Foxn ARC K8BA (+K8B0C) Smart Club W6VYNO (+W06FGV) Hopkins Co, Tradewater & Dawson Spgs ARCS K44CH (+K44JTA) St. Peters ARC KB8V (+N8GOM) Millford ARC W8SDL (+N8HIA) Hattiesburg ARC W5NA (+K85AZZ) Valley Forge FDG N3KZ (+K43UUM) Bryan ARC N5TC (+N5INV) Ozarks ARS K8EJ (+N8GNN) Penny Pines Brass Pounders N7CW (+K8BVUE) Blackstone Valley ARC W1DDD (+W1P0X) Fairfield ARA & Univ of Cincinnati ARC W8YX (+K8BDWZ) N Ridgeville RA K8JK (+N8KMO) Lynchburg ARC K4HEY (+K84OLC) Wilderness Trail ARC K8B Old Pueblo RC W7GV (+K87GOW) Joliet ARS W9OFR (+K49YPD) Regina ARA VESNN Oscoda ARC K4MFP (+K4K4PP) Metuchen ARC K2YNT BPAPA K6ANP Novi ARC W8RS (+K88HME) Gadsden ARC K4JMC (+K4CAANB) Monterey Bay FDG K16EO (+N8VKB) Ottawa Valley Mobile RC & Ottawa ARC VE3JVV Big Island ARC KH6B (+W8BIBR) Twin City Hams W5EA (+N5NNJ) McHenry ARC K891 (+K9ERC) San Fernando Valley ARC W6SD (+K86WDL) Huntington Co ARS N03P (+N9IEM) Foothill ARS K6YA Utah ARC W7SP Grand Rapids ARA W8DC Hicks & Clark RC W0GE (+K89CUD) Tamaqua Area ARA W3VA Billy The Kid Chapter W25R (+K85GIV) N. Augusta-Belvedere RC K4FT Irvington FAC K2GQ ARC of Savannah W4HBB (+W44FIH) BEARS & Vashon Is RC K5SNG (+N5GEL) Las Cumbres ARC K6FB (+N6TCM) Old Bridge RA W0CN (+K82HVQ) S Midway ARC W3PT (+K43RZJ) Quinte ARC VE3RL Cherryland ARC N8FT (+N8JIM) Lewis & Clark Is RC K7NWS (+N7EXC) Montclair Area ARC W8BZ (+N8JUC) Virginia Inbreds N4PMO (+N4TRX) American Red Cross ARC NV1E (+N1EWQ) Pecos Valley ARC K5LVW Tandem RAC AA6SS (+N6TPT) Lewis & Clark ARS W2FSL (+K82BIP) Carolina ARL K54S (+K84LLC) Emergency ARC KH6BS (+K8HNN) ARCS of Edison Township W2VY Pilgrim AWA N1AIS (+N1ELF) Kendall ARS W5KO (+K45OSM) N. K7YLV (+K87HVI) Emergent Electric ARC K4GGI (+N8MFP) KCG W6BZQZ Humboldt ARC K83P (+N8GME) Gonzaga Prep Ham RC K07FJ Orville ARS K8DEU Echo RA N29V Mancorville ARC W9DK (+K89APS) NOARS K8KRG (+K88VTS) ZOT ARS K1GVB Manatee ARC K4GG (+N4UEN) Saragota Co RACES W42JMX Master of Orion ARS N8DVK (+K43SEQ) ARC of Bloomington W6GR (+N8BUA) Racal Milgo ARC ND43 (+K84RLS) W8AL US Sprint ARC KF4CI Watertown ARC N9HR Gulf Coast ARC W04O Mt Vernon ARC K8EEN PCARS AB4GI (+N4QWV) Ausable Valley ARC W7BG (+K8BHJ) Greater Norwalk ARC KE1F (+K41RAD) Ole Virginia Hams N4SN (+K84RL) Tri-State ARS W9OG (+K89CNE) OSL Crazyes N86SL Nappawee ARC N9RM (+N9EWN) Lake Co ARC W9LJ (+K49BL) Yonkers ARC W02D (+N2JDF) Strates Area ARC W8FF Calhoun Co ARA K4MGE (+N4NAU) Waterson ARS W0NT (+N0ZJH) Coconino ARC NNTA (+N7JWM) Cretaceous Ball ARS K6IG (+K86GON) Central Kansas ARC W8CY (+K402NB) Hickwood ARA W1QI (+W81EPO) Gaston Co ARS K4KAT Northern Alberta RC VE8NC Western Colorado ARC W0RRZ (+K80CMR) ERAA & Tin Lizzy ARCS K8VA Stillings Farm Expedition W9RVP (+K49KBU) North Arkansas ARS K5LG (+K85EHR) Champlain Valley ARC W2UXC Upper Valley ARC A8Q Rideau ARC VE3BPC Texoma & McKinney ARCS K5GQD HARLEM K3EI Navarro ARC AA5MB (+N5OLC) American Red Cross ECS N2MH Belmont Co ARC W9PC Mt Baker ARC K7SKW (+N7MMH) Sweetwater ARC W07F (+K87HEQ) Southeast Valley ARC NN1M (+W81HBW) Xerox ARC W02P (+K82HQ5) St Paul RC K8GFW (+K40PFZ) Bristol ARC W4VS (+K4CALW) Casper ARC W7VNJ (+K47DYX) LAMARS W9HOQ (+K49UNQ) Old Fruitville ARS N4TKS (+K45SYV) Western Pennsylvania ARA K53N (+K43LNQ) Florida Keys ARC K44TT5 (+K44CUJ) Suburban ARC K3MTK (+K43MER) NEMO ARC W8CBL Hiawatha ARA K0JUL Northrop B-2 Division ARC AA6CR (+K86QYD) TRIARC ARC W3SV Transylvania Co ARC N4GBY (+K40QHR) Loudon Co ARC W4WVJ Weasel's Weiridos K4W4M (+N4TLR) SCCORA W4WVJ (+K86ICQ) Fair Clair ARC K9GXU Lodi ARC K6PJV (+K86SLE) Central Michigan ARC W8MAM (+K88DGC) Keweenaw River Valley ARC W6TN Yuba Sutter ARC W6HBU (+K6C6NP) Niagara RC W2QYV Laurel ARC N5KKG (+N5NCH) NCG K1DII (+K41TKL) West Seattle ARC W7WV Forestry ARC W4NC (+N4UIV) Johnson Co RAC W6HRH (+K80DKK) Ephrata Area RS N3JL St. Rockefall ARS W8NUJ (+K88AKS) Stewart Lake ARC W07X (+N7MJC) Contoocook Valley RC K1BKE (+N1GJF) Blue Ridge ARC N4FBC Chesapeake Bay Area ARS K43I Bridgerland ARC AET Austrian ARC W70A (+K88DUH) Albemarle ARS W4M4D (+N4VQJ) Aroostook ARC K4IB (+K41QVJ) Ogdenburg ARC W2NR (+N2TR) Onslow ARC W04FVO (+K44EJK) Hartlan Co ARC W4M (+K41VJ) South East Texas ARS W5SSU (+K85GXN) SLURP K88PR NVARIES K9N Patrick AFB MARS Team K4FD Willmar Area EAR W8SW Hot Springs ARC W45BRF (+K85PHH) Lower Yellowstone ARS WM7D (+K87FGN) Lakeview ARA & S&C ARC N8GU (+K49GZU) Petersborough ARC VE3RB Carver ARES/SMARTS KB8QO Natick, Kitsap ARC W07B (+N7KUJH) South Towns ARS W82ELW (+K82EQV) Central Wisconsin Radio Amateurs W9NN Kanawha ARC W8GK (+K82GY) Waldo Co ARA & Pen Bay ARC K81OF Parsons Area ARC W5OR Huntington Beach DX Assn N8RDL Texins ARC K5QJ (+N5NFP) Cape Ann ARA W1RK (+N1GPX) Chippewa ARC W8BA Albany Co RACES KN2I Branch Co ARC W8BR F. Madison ARC N8WB CRA Maskoutin VE2CAM Centerville ARS W8BA Belmont Co ARC A8BU Central Vermont ARC W1BD (+K41LDL) South Side ARC W08P (+N8KNQ) Albans ARC W5CR US Center ARC N2OM Blossomland ARA W8MAI (+W88MWT) ARC of Mt Vernon W9BFO (+N9AXB) West Georgia ARS W4FWD Auburn ARA W42L (+K82EMX) Chesapeake Bay RA K03B (+N3GSW) YARS N6GF (+N6QGG) Morbidge Area ARC W88P Jupiter-Tequesta RG K4ZRP (+K4CWF) Tampa ARC W4DUG (+K44FFI) Liberty Co ARC N4FLU (+K45XN) Nostalgia ARC NM5D (+K85IPT) West Morris Wireless WN2A (+K86PKD) Allegany Highlands ARC W02E Carksville ATIS KF4L Fairfield HS ARC K88PR Missouri Valley ARC W8NH Fair Lawn ARC W02T (+K82FUM) Moose Horn ARC K71EJ Sabine Valley ARA W88P Sheridan RAL W7LUX Fox Cities ARC W9ZL Southern Catskill ARS W02E Northeast Wisconsin RL WF9H (+K89BNH) Arlington CD N1IR Piano ARK W4GAT (+N5DBI) Lockport ARA W2RUI (+K82CXM) ARA of Bremont W7VE Falls ARC W8NH Johnson City RA W4ABR Wantage ARC W2VA Grand Is ARC W02E Ham & Eggs Soc W7SU (+K85JHK) Amateurs for Better Communications K03NG (+K89CVL) Central Kentucky ARC VA4UXJ (+K44HTZ) Steamboat Mt ARC K8SD Aurora Repeater Assn K8WIO (+N8KAI) Greer ARC W4QIC (+K44FBV) Estero ARC W6UJ Franklin ARC NT4K New Ulm ARC N8BMA (+N8KKH) Lehigh Valley ARC W3OI Nevada Co ARC W6DD Great Falls Area ARC K7AC Lanierland ARC W4IKR Southeast Louisiana ARC W8NET OCARE WASZAA Corry Amateur Operators N82K Haskell ARC K8GNW (+N5NTB) Fullerton RC W8ULI Leward Oahu ARC KH6MOP (+W86BEV) Lake Co ARS K6RAC (+K8BWUW) Hermiston ARC K07VX (+N7LJY) NCG VES3OO SIARS W8XN (+K89BNB) Marshfield Area ARS W8WK Maple Ridge ARC VE7CMR RAGS K7JUV (+K87DRT) Butler Co VHF Assn W8CCI (+N8KPK) Huber Heights ARC N8TD (+K8BELA) Melfort ARC V5YD Catalpa ARS W8AG York Region ARC VE3YRA SOTIS-RATS-WATTS W4AY HTTY-AMST Houston N5EM Ellsworth AWA W1TU Santa Ynez Valley Hams N6JNS (+N8SUF) NW AR/ Electronics Assn N00G Robbinsdale ARC K8LTC (+N8GKO) Ogden ARC W47AD Rappahannock ARC AA4OH (+N4VCZ) Dial ARC W8BLV Dixie ARC W17J XWARN W8BFWG (+K88GRO) Southern Appalachian Wireless Soc W8RM Acadia ARA K1NAN Accident Radio Nerds W82EKK SMARTS NT5K (+N5OKV) Thunder Bay ARC K8CHS (+K8BHM) Porter Co ARC N9FB Ellis Co ARC N5KFC Tomkins Co ARC W82K Glynn ARA K4TVE (+K44DNJ) Central Georgia ARC AA4WS (+K84NMH) Cascade RG N7CPO (+N7LRO) Lakes Area ARC W8PZH Goshen ARC K9TSM (+K89ATR) Mogollon Monsters K7LPA (+K47RVZ) Parkland ARC VESII Humboldt ARC K4AP WIGWAG W8PD Northwoods ARC N9BDL (+K89CHP) Kings ARC W86K Lee DeForest RC W8ETB (+K86JSI) Seneca RC W8ID Wichita ARS W5WI Los Angeles ARC N6YA (+K88DHW) STARS N8YD Ponca City ARC W5HZZ Columbia Area Amateurs AARC (+K49JUA) Mercury Midwest Columbus Contingent K8ES (+N8IWE) Morse Memorial RA K8DYX (+K9TGT) Huntingdon Co ARC W3VJ 224.080 RG Clarkston N8IOR (+K41RIX) Delta Group N1GKU Pike CCDACS W4TJM Ft Pierce ARC K4JYF (+W84NOZ) West Marin RACES K6JOC Flathead Valley ARC K7LJ Antigonish NS ARC VE1EMA SEARC K8EMY (+K88CZU) Fentress City ARC W572 Borderline ARC W87L Harvard Repeater K1BOX Cal State Fullerton ARS N8XM El Paso ARC W5ES (+K85HQE) Martin Co ARA K4ZK Conneaut ARC W8SD Bishop ARC N8WC (+K88CHT)	1245-2-40-4,674 1422-2-21-4,670 1282-2-30-4,670 1208-2-20-4,670 1301-2-50-4,598 1187-2-17-4,556 1197-2-20-4,528 1322-2-19-4,518 1130-2-12-4,502 1268-2-13-4,472 1366-2-15-4,456 1152-2-11-4,398 1552-2-19-4,368 1050-2-20-4,366 1429-2-19-4,338 1414-2-33-4,326 1191-2-20-4,304 1331-2-12-4,300 1156-2-46-4,278 889-2-20-4,264 1457-2-50-4,258 1512-2-12-4,248 1299-2-21-4,248 1134-2-22-4,244 1756-2-12-4,232 1083-2-40-4,224 1152-2-40-4,214 1709-2-35-4,212 1253-2-28-4,198 1080-2-18-4,174 1462-2-7-4,164 1232-2-15-4,158 1282-2-15-4,158 1145-2-12-4,152 1143-2-15-4,140 1157-2-37-4,118 1117-2-29-4,114 1285-2-19-4,058 1501-2-29-4,050 1141-2-55-4,050 1042-2-16-4,046 1118-2-15-4,022 1395-2-15-4,006 1218-2-60-3,954 1225-2-16-3,920 1016-2-13-3,884 1320-2-21-3,868 914-2-21-3,852 1035-2-17-3,826 996-2-25-3,822 960-2-24-3,814 1041-2-27-3,806 1546-2-24-3,798 1194-2-14-3,776 1278-2-25-3,754 1241-2-10-3,752 1228-2-6-3,744 1518-2-18-3,742 1335-2-12-3,730 877-2-12-3,698 1021-2-23-3,696 926-2-15-3,686 1329-2-20-3,618 1033-2-12-3,614 1309-2-32-3,606 932-2-15-3,602 1046-2-21-3,598 1025-2-8-3,578 839-2-16-3,572 948-2-40-3,508 1607-2-8-3,494 886-2-33-4,474 1266-2-82-3,462 1076-2-25-3,456 1179-2-20-3,456 946-2-53-3,450 1240-2-21-3,448 930-2-13-3,442 998-2-20-3,400 902-2-9-3,358 992-2-20-3,352 882-2-17-3,344 980-2-19-3,342 740-2-15-3,320 1266-2-20-3,310 955-2-39-3,296 991-2-16-3,270 943-2-18-3,248 1107-2-21-3,242 1011-2-57-3,240 791-2-28-3,224 907-2-76-3,224 872-2-50-3,204 421-5-18-3,195 1200-2-18-3,184 781-2-31-3,178 726-2-9-3,158 864-2-14-3,154 853-2-32-3,128 1145-2-12-3,128 1024-2-40-3,104 924-2-15-3,082 1166-2-25-3,076 978-2-12-3,076 1241-2-15-3,074 882-2-16-3,068 1105-2-20-3,048 875-2-20-3,016 1167-2-9-3,004 1067-2-40-3,000 823-2-20-2,998 913-2-22-2,996 921-2-30-2,988 692-2-3-2,968 1207-2-19-2,948 968-2-15-2,942 971-2-23-2,932 862-2-26-2,928 684-2-15-2,922 766-2-81-2,914 971-2-7-2,912 862-2-10-2,904 753-2-35-2,896 844-2-9-2,884 680-2-50-2,880 757-2-14-2,878 650-2-35-2,852 799-2-25-2,852 774-2-27-2,848 1264-2-3-2,844 1163-2-30-2,826 733-2-48-2,818 1051-2-15-2,816 782-2-12-2,814 748-2-30-2,810 911-2-10-2,802 767-2-21-2,768 801-2-60-2,768 657-2-21-2,762 850-2-20-2,756 741-2-20-2,752 997-2-23-2,720 907-2-15-2,720 966-2-30-2,702 720-2-4-2,698 864-2-21-2,682 713-2-20-2,680 1079-2-20-2,658 735-2-12-2,654 780-2-22-2,650 654-2-10-2,644 1030-2-51-2,614 919-2-15-2,600 709-2-12-2,600 804-2-40-2,594 733-2-25-2,590 891-2-15-2,584 749-2-24-2,584 787-2-25-2,572 567-2-31-2,568 981-2-15-2,562 909-2-25-2,550 878-2-20-2,550 757-2-20-2,536 909-2-11-2,530 668-2-12-2,528 586-2-8-2,526 623-2-25-2,500 754-2-17-2,490 1044-2-12-2,490 935-2-14-2,484 794-2-30-2,482 682-2-11-2,470 722-2-26-2,450 523-2-7-2,440 837-2-16-2,430 614-2-20-2,422 556-2-11-2,416 659-2-13-2,416 636-2-20-2,408 742-2-15-2,356 1004-2-22-2,348 744-2-20-2,340 573-2-50-2,302 824-2-34-2,300 677-2-7-2,300 620-2-20-2,298 858-2-10-2,298 548-2-8-2,288 694-2-18-2,280 696-2-11-2,254 613-2-20-2,252 581-2-11-2,250 632-2-21-2,242 645-2-41-2,238 590-2-13-2,230 668-2-25-2,226 720-2-10-2,224 592-2-50-2,220 745-2-9-2,218 709-2-12-2,204 780-2-10-2,196 726-2-32-2,196 651-2-19-2,186 881-2-25-2,186 583-2-20-2,182 602-2-20-2,170 566-2-20-2,170 630-2-18-2,164 540-2-10-2,156 545-2-24-2,154 741-2-23-2,144 578-2-18-2,132 567-2-5-2,116 473-2-11-2,110 455-2-46-2,100 465-2-20-2,092 417-2-3-2,082 444-2-15-2,080 551-2-15-2,078 419-2-14-2,078 767-2-12-2,076 837-2-10-2,074 732-2-55-2,064 656-2-10-2,050 656-2-12-2,028 420-2-20-2,018 472-2-34-2,010 703-2-14-2,010 592-2-13-2,004 420-2-15-2,000 399-2-14-1,990 689-2-14-1,988 447-2-6-1,982 889-2-17-1,978 1097-1-30-1,967 460-2-34-1,952 694-2-26-1,950 584-2-15-1,936 474-2-20-1,934 501-2-21-1,932 577-2-10-1,930 562-2-20-1,926 488-2-21-1,924 472-2-9-1,914 674-2-20-1,912 483-2-6-1,906 464-2-12-1,898 567-2-13-1,898 495-2-12-1,896 678-2-10-1,884 457-2-20-1,884 623-2-8-1,876 330-2-9-1,868 453-2-10-1,862 478-2-21-1,858 596-2-25-1,850 629-2-25-1,848 486-2-15-1,846 641-2-6-1,842 569-2-14-1,834 665-2-10-1,830 604-2-54-1,816 568-2-21-1,816 380-2-12-1,808 443-2-34-1,802 491-2-12-1,796 608-2-20-1,796 566-2-20-1,786 549-2-20-1,768 649-2-20-1,778 600-2-15-1,764 443-2-4-1,754 664-2-25-1,752 606-2-11-1,744 620-2-15-1,740 1129-1-42-1,727 386-2-27-1,722 702-2-14-1,716 466-2-20-1,700 352-2-9-1,698 535-2-12-1,694 576-2-5-1,694 601-2-31-1,692 653-2-18-1,682 387-2-6-1,680 567-2-13-1,678 417-2-15-1,674 663-2-15-1,660 426-2-20-1,652 479-2-13-1,636 1020-1-24-1,630 533-2-11-1,628 380-2-10-1,626 485-2-18-1,620 552-2-15-1,604 585-2-23-1,586 406-2-28-1,586 307-2-14-1,584 476-2-8-1,582 610-2-15-1,564 488-2-5-1,562 442-2-4-1,560 414-2-30-1,558 574-2-10-1,548 564-2-25-1,540 412-2-19-1,532 380-2-12-1,528 274-2-15-1,524 364-2-18-1,520 405-2-8-1,518 372-2-15-1,516 450-2-18-1,504 409-2-19-1,504 552-2-8-1,504 913-1-18-1,484 285-2-10-1,476 266-2-61-1,476 387-2-11-1,474 338-2-46-1,468 379-2-5-1,458 516-2-35-1,458 376-2-27-1,452 542-2-4-1,446 396-2-15-1,428 329-2-12-1,426 215-2-22-1,412 377-2-7-1,408 287-2-10-1,404 447-2-15-1,394 395-2-3-1,390 334-2-10-1,384 400-2-18-1,380 221-2-6-1,378 390-2-12-1,376 274-2-12-1,348 297-2-20-1,346 572-2-10-1,344 405-2-34-1,336 493-2-9-1,334 245-2-5-1,332 460-2-45-1,330 241-2-11-1,324 456-2-18-1,322 351-2-15-1,306
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Dave, N6SHD, and Dick, WA6HYO, operated the 10-meter station at W6RFF's FD setup.

Pictured are some of the 38 members of the Kauai ARC, KH6LG.

<p> NCG KI60D Pike Co ARC W9CZH Clinton Co ARC WA9YKO Statesboro Area RS NC40D (+N4TUZ) Newport Co RC W1SYE NGC KI6WD Apple Valley ARC AlbG (+K4QQB) Central Carolina ARS W14E Middle Peninsula ARC NB4P Roanoke Valley ARS AA4SJ Mission Emergency ARS VE7MIS ARA de la Maurice VE2MO Greenwood ARC VE1WN Garden City ARC KC8HR Richmond ARC VE7RAR Sunrise Co ARC KB1XJ St Peter ARC W0RA (+N0JHG) Kings Co RC W2RAK Mahaska ARC NR0C Univ of Idaho ARC W7UQ Harrisburg Radio ARC W3UU South Bay ARC W6ATT Elgin RC W9SCVP Mercury ARC KC7FN 6-Meter Club of Chicago K9ONA Piqua ARC W9SWS (+K8GGZ) Gablan ARC KB6EV Sandy River ARC K11B Lake Huron ARC WBJC Tar sands ARC VE8CF Pendleton ARC W7PL NGC WA3JUXZ Elmwood Park ARC K9YHB Mara Huntville Group K44AI (+K4IWW) Manotick ARG VE3AIR Collins Radio ARC K3QKP LKM ARS W6ISO Apple City ARC W7TD Illinois Valley ARC N9M Westcum ARC CY1WRC Old Post ARS W9EOC 11th Hour Contest Group K4BYB Barrie ARC VE3GCB Covington ARC K24S Chilliwack ARC VE7AFA Botsford ARC KC8GP Spalding Elementary Students AB4KS </p>	<p> 436- 2- 6- 1,302 326- 2- 15- 1,296 299- 2- 20- 1,284 452- 2- 6- 1,282 314- 2- 15- 1,278 388- 2- 4- 1,276 331- 2- 16- 1,262 275- 2- 9- 1,250 394- 2- 16- 1,234 361- 2- 12- 1,232 343- 2- 8- 1,230 369- 2- 20- 1,220 243- 2- 10- 1,210 297- 2- 15- 1,208 437- 2- 21- 1,200 481- 2- 9- 1,162 238- 2- 8- 1,158 257- 2- 48- 1,120 407- 2- 20- 1,114 270- 2- 20- 1,110 380- 2- 9- 1,108 240- 2- 8- 1,102 244- 2- 3- 1,062 215- 2- 22- 1,056 184- 2- 3- 1,052 238- 2- 20- 1,046 320- 2- 15- 1,040 310- 2- 11- 1,020 359- 2- 16- 1,018 212- 2- 10- 994 324- 2- 4- 966 305- 2- 3- 962 225- 2- 5- 950 147- 2- 14- 928 313- 2- 20- 926 257- 2- 10- 914 225- 2- 4- 852 162- 2- 9- 850 257- 2- 25- 838 107- 2- 7- 814 257- 2- 7- 814 146- 2- 9- 802 229- 2- 16- 800 268- 2- 9- 794 253- 2- 10- 716 155- 2- 12- 716 153- 2- 3- 706 </p>	<p> Lambda ARC K9AT Egyptian RC W8AKU (+KASHDZ) Franklin Co ARC AC4W (+N4UKQ) Salem Area ARA NW8E (+KB8HOC) Wedixie ARC W84MZO Crocket Wireless Assn K1SSO Out of Our League FDG K1ET Tippecanoe River Radio W03L F1 Wayne RC W9TE (+N9GSP) Indian Foothills ARC W80WMM Mid-State ARS NF4S Country Cousins K3KW (+K43NWM) Crete ARC K8UQ Heart O'Texas ARC W5ZDN Red River RA NK4A Valley Latin RA KI6F Michigan Army MARS RC AF8D CHARRO W5KR Trojan ARC K0BJ Tu-Buro RC W2BMM Cooke Co ARC & RA NS4CJ West Tennessee ARS K84YGI </p>	<p> 52- 2- 10- 704 80- 2- 5- 684 135- 2- 17- 670 134- 2- 26- 668 207- 2- 5- 614 106- 2- 15- 612 190- 2- 7- 580 151- 2- 3- 570 276- 2- 11- 552 120- 2- 8- 540 119- 2- 7- 538 99- 2- 3- 494 59- 2- 6- 488 82- 1- 20- 482 236- 2- 5- 472 75- 2- 10- 450 88- 2- 5- 404 81- 2- 9- 388 139- 2- 5- 340 57- 2- 7- 314 104- 2- 12- 308 73- 2- 15- 246 </p>	<p> 2A Commercial Pottstown ART N3WW Boiled Owls of New York W2AX Reidsville ARG N4IV Bluegrass ARS K4KJQ W54P (+N4HTX) Mohawk ARC NA1P (+N1EWJ) West Side RC of Toronto VE3JJ Rowan ARS W1EXU Bully Hill ARG K2GF North Shore RC WV7T North Shore RA W2RCX East Kootenay ARC VE7IP Spring Dog ARC W0JUY Pale Alto ARA K3C5G NGC N1FWC </p>	<p> 1466- 2- 10- 4,554 2915- 1- 14- 4,320 903- 2- 17- 3,542 780- 2- 4- 2,704 917- 2- 25- 2,690 665- 2- 35- 2,662 593- 2- 6- 2,324 731- 2- 14- 2,252 565- 2- 9- 1,498 320- 2- 10- 1,214 475- 2- 14- 1,098 396- 2- 18- 996 267- 2- 10- 734 188- 2- 6- 580 68- 2- 3- 268 </p>	<p> 3A Battery Arapahoe RC K8NA (+K8BAQQ) Summit ARC K53L (+N5DPB) Zygo ARC W1ECH (+K41MWT) Anne Arundel RC W3VPR (+K43TDD) Thomasville ARC WAUCJ (+W4ACJL) Montgomery ARC N3BE (+K43USD) Ampex Empl ARC K6QEZ "A" Team W4RRW </p>	<p> 2280- 5- 30- 18,265 2603- 5- 16- 16,805 1233- 5- 9- 10,715 1195- 5- 37- 9,895 899- 5- 17- 8,420 878- 5- 30- 7,490 777- 5- 10- 7,240 661- 5- 8- 7,010 </p>	<p> North Coast ARC KB8A (+W82ZG) OK QRP W5LGO (+W5D5RL) ABARC-ORP ARC Group W1XH Michigan QRP Group W8LHG RF Triangle W5TXW (+W5D5HNI) </p>	<p> 702- 5- 21- 4,265 386- 5- 6- 4,045 239- 5- 8- 2,755 224- 5- 5- 2,540 76- 5- 4- 380 </p>	<p> 3A Hughes Fullerton Emp Assn ARC N6AW (+N6RNG) Ashabula Co ARC W8CY (+K48LTE) Shanktooth ARC N6NW (+N6TPN) Poughkeepsie ARC N2YL (+K2G2YB) Acton-Boxboro ARC W1UC (+K42DJH) K2VL (+K82B3C) Rochester (NY) DX Assn W2TZ (+K82CHC) Red Ryder CB SW Ohio DX Assn W8FN Waterbury ARC K1EB (+K41RRG) Shreveport ARC East Bay ARA W5RA (+K45RDA) Northwest ARC W9LM (+K69BSW) East Bay ARA N1RI (+K41OTN) Calumet ARC Enthusiasts KE9I (+K48ZFG) Jet Propulsion Laboratory ARC W6VIO (+K6ADAN) Helron AWG K1DW (+N1GQX) Redwood Empire DX Assn N6OJ Palo Robles ARC W6LKO (+K6SDFD) Cape Way RC K1BU (+K41BBU) Delaware Lehigh ARC W3OK (+K43TER) Fredrickson ARC VE1ND Dauville DX Assn NM3E (+K43PLC) Albany ARC K2CT (+K2CBA) Shelby Co ARC AC4T (+N4SYV) Southern Peninsula ARC W4PRO (+N4PUV) Hamelsters RC W9AA (+K49STV) Ozaukee RC W9WQ (+N9INW) North Shore RA W1ND (+N1FKF) Band Dit-Dahs K2MP (+K2BDFN) San Mateo RC W6LMI (+N6TDC) Pale Alto ARA W5OTX (+K6SAGP) General Dynamics RC W5IU (+K6J5TG) AR River Valley ARF K5PXP (+N5KVR) Kilocyte Club K5LP (+K4SEOO) Twin City RC W7LA Goz's Gang K2SA (+K62CHV) Kent Co ARC W5HZW (+K43MIY) CFB Gagetown ARC VE1JO Japanese American ARS W6AN (+K6BGT) Club de Radio Sherham VE2FT </p>	<p> 4335- 2- 50- 13,670 3840- 2- 18- 12,450 3715- 2- 10- 11,854 3502- 2- 45- 10,140 2842- 2- 25- 9,648 2758- 2- 50- 9,434 2894- 2- 31- 9,294 3004- 2- 11- 8,788 2471- 2- 12- 8,484 2389- 2- 28- 8,270 2208- 2- 22- 8,010 2453- 2- 22- 7,894 2369- 2- 27- 7,782 2443- 2- 32- 7,754 1988- 2- 10- 7,350 2071- 2- 14- 7,338 2215- 2- 39- 7,162 1856- 2- 21- 7,110 2276- 2- 50- 7,034 1930- 2- 19- 6,962 2389- 2- 25- 6,730 2064- 2- 35- 6,566 1690- 2- 51- 6,532 2156- 2- 81- 6,474 2341- 2- 25- 6,276 1623- 2- 37- 6,256 1718- 2- 36- 5,952 1609- 2- 16- 5,922 1687- 2- 30- 5,868 1855- 2- 28- 5,830 2068- 2- 35- 5,718 1422- 2- 38- 5,564 1808- 2- 13- 5,560 1780- 2- 12- 5,554 1345- 2- 13- 5,168 1686- 2- 28- 5,006 1294- 2- 12- 4,888 1373- 2- 21- 4,672 1354- 2- 20- 4,670 </p>	<p> San Andreas Faultline Survivors N26N Clark Co ARC W6WMI (+N6DPR) Paducah ARA W4NUA (+K4CENA) San Lorenzo Valley RC N8TU (+N6OLL) Columbus ARA W5TO (+K85EMG) Downey ARC W6TOI (+N6OPR) Virginia Beach ARC WA4TGF (+K44UED) Washington Co ARA K01G (+K41RDI) HCARES KN9K (+K89CMS) Longview-East Texas ARC K5LC MS Coast ARA K5OS Elkhart Red Cross ARC W9XD Oregon Tualatin Valley ARC K07B (+N7LMK) Schaumburg ARC K9SB (+K48ZOO) West Allis ARC W9FK (+K8BAUQ) Springhill ARC N5II Colunial Wireless N01JR Sixus Empire ARC W0ZVY (+N0MMV) Hosier Lakes RC Delaware Valley RA W2ZQ (+K82GQM) Tri-Town RAC W9VT (+N9FUW) Hoosier Lakes RC K9RD (+K98XG) Great Bay RA W81CAG (+K41LLP) Great South Bay ARC K2TV (+N2FIM) Oskola City ARA K5OK (+N5DDB) Douglas Co ARC W8XJ (+K48TXJ) Frontier ARS NW7S (+N7CFC) Indianapolis ARC WA4M (+N4NTX) Argonne ARC W9OVE (+K49PVD) Parker Co RC WDSF (+N5ONE) RF Communications ARC W82PSI Williamson Co ARC W5XD Fl Smith Area ARC W5ANP Newington ARC W1OKY (+K41KRP) Ascension ARC W5NK CRA de Quebec VE2CQ Top of Michigan ARC WNBV Montgomery ARC WA4P (+N4MDV) McKean Co ARC W3VJ (+K43UVD) VE7ECC (+V71AA) Canadian Valley ARC WBSU (+N6TSO) Jones Co ARC W6GN Discrete Components of 955 Q3WJV Clinton Co ARA WFB8 (+N8JWR) Anaheim ARA K6SYU Corona Norco ARC KJ6B (+N6RNC) Smoky Mountain ARC W4OLB (+K4ARU) </p>	<p> 1867- 2- 20- 4,650 1300- 2- 80- 4,600 1371- 2- 30- 4,596 2980- 1- 20- 4,563 1385- 2- 20- 4,510 1221- 2- 80- 4,476 1300- 2- 150- 4,472 1516- 2- 30- 4,468 1326- 2- 26- 4,436 1542- 2- 17- 4,434 1172- 2- 25- 4,412 1291- 2- 10- 4,262 1507- 2- 60- 4,258 1157- 2- 33- 4,186 1544- 2- 17- 4,178 1314- 2- 20- 4,156 1164- 2- 18- 4,140 1056- 2- 25- 4,138 1235- 2- 15- 4,078 1140- 2- 17- 4,062 1441- 2- 11- 4,034 1249- 2- 30- 4,008 1085- 2- 70- 3,938 1044- 2- 20- 3,912 1193- 2- 30- 3,900 939- 2- 34- 3,900 1207- 2- 39- 3,896 993- 2- 13- 3,872 1115- 2- 30- 3,866 1127- 2- 8- 3,866 1223- 2- 11- 3,856 1293- 2- 30- 3,838 1041- 2- 31- 3,818 1072- 2- 35- 3,814 901- 2- 35- 3,800 1056- 2- 12- 3,780 1100- 2- 17- 3,720 1152- 2- 22- 3,700 1349- 2- 15- 3,594 1248- 2- 13- 3,562 1140- 2- 9- 3,512 957- 2- 10- 3,504 890- 2- 15- 3,494 917- 2- 20- 3,494 1266- 2- 21- 3,488 1135- 2- 17- 3,484 </p>	<p> Colorado Bighorn ARC KC7KC Coastline ARC W6STOW MITRE-Washington ARC AA4VN (+N4UUA) Tri-City ARC W7VPA (+W87VCC) Twin Cities RC W8ZF (+K80EDG) New Providence ARC K2VJ NGC K6PD Panhandle ARC W5WV South Western VA WA KC4DY (+K4CIUP) Key City ARC AESJ (+K85JOR) Livermore ARC K6TS (+K86VWY) Southwest Florida RA N4SBF (+K82EKZ) Lake of the Ozarks ARC WADE (+K80CAC) Oakville ARC North Hills ARC W3XX (+W3BIS) Palisades ARC NK9Y (+K49ZKT) Malibu DCS NW6A (+K86ZZN) Kaw Valley ARC W8CET (+K48BNL) Independent ARC W6DM Clarkston Crazies W6RPMC Port City ARC W1WQM (+W41TOL) Part of Westford AB1A (+N1GRC) Poway ARS K6GRI (+N6GVJ) Burnell Memorial FDG W4UOT Jayhawk ARS W8LB (+N8CV) West Island ARC VE2CWI Burnaby ARC VE7BAR Sangamon Valley RC W9DUA Rappahannock Valley RC K4ME (+K4CAUV) Spa ARA KESRK South Georgia ARC WX4T (+N4UXE) Northern RI RC NM1Y OH-KY-IN ARS K8SCH 3M ARC W8MR (+N8KIL) VCARA W9MJL (+K89BYV) W8MFE (+N8GFM) Bodega Beach Bums KI6OI Western Michigan WA W8FH (+K8VQJ) Marshall RC W8BM Frankingham ARC W1FY Racine Megacycle Club W9UDU Calamani ARC K4MFE (+N4UWX) Staten Island ARA W2CWW (+N2GMU) Southwest Dallas Co ARC K5HJ J5JSS W2ZDR Surrey ARC VE7SAR </p>	<p> 1346- 2- 7- 3,462 932- 2- 13- 3,446 802- 2- 12- 3,444 901- 2- 20- 3,414 947- 2- 35- 3,388 987- 2- 20- 3,384 975- 2- 5- 3,378 909- 2- 20- 3,378 888- 2- 15- 3,354 1088- 2- 30- 3,330 1192- 2- 10- 3,320 1454- 2- 20- 3,316 804- 2- 23- 3,308 830- 2- 21- 3,288 757- 2- 21- 3,264 859- 2- 13- 3,258 797- 2- 100- 3,256 1072- 2- 25- 3,242 872- 2- 11- 3,240 1122- 2- 7- 3,184 862- 2- 40- 3,178 913- 2- 22- 3,156 1007- 2- 28- 3,126 950- 2- 20- 3,104 664- 2- 30- 3,084 867- 2- 26- 3,076 934- 2- 25- 3,058 905- 2- 15- 3,042 743- 2- 15- 3,040 1180- 2- 52- 2,962 1043- 2- 11- 2,958 2254- 1- 15- 2,923 981- 2- 35- 2,916 848- 2- 25- 2,916 955- 2- 14- 2,880 867- 2- 15- 2,852 710- 2- 8- 2,836 1704- 1- 10- 2,800 1043- 2- 15- 2,786 705- 2- 20- 2,780 877- 2- 25- 2,772 713- 2- 11- 2,758 832- 2- 12- 2,750 965- 2- 20- 2,746 1083- 2- 20- 2,716 915- 2- 15- 2,696 </p>
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Westark ARC W55L	1145- 2- 26- 2,690	Golden Empire ARS W6RHC	514- 2- 44- 1,826	NGC AA5GB	224- 2- 10- 786	Garden State RA W2GSA	1132- 2- 35- 3,050	Two Rivers ARC W3UST	1824- 2- 30- 6,706
Bentonia ARC WB8DHH	696- 2- 16- 2,664	Melpar WB4Y2S	608- 2- 6- 1,810	MARA—Boise N7IFD	122- 2- 18- 744	Quana Powitt RC W1EKT (+N1FXL)	784- 2- 33- 3,036	W3STU	
Purdue Co ARC W9Y8	795- 2- 5- 2,662	Harrison ARC KM9E (+KB9ABA)	403- 2- 18- 1,806	Conair ARC W6UUS (+KB6HUP)	316- 2- 16- 736	Ta County ARC NA4T	834- 2- 23- 3,034	GE ASTRO ARC W2DU (+KB2FXV)	2015- 2- 37- 6,410
Brightfield ARC W4AMU (+KC4AJM)	862- 2- 27- 2,648	Rochester ARC W6MXXV	781- 1- 35- 1,797	Messabi Wireless Club NM0S	222- 2- 6- 720	Muskegon Area ARC W82HO (+KB8ARY)	981- 2- 40- 2,980	Bergan ARC K2ZO (+KB2ECO)	1729- 2- 15- 6,374
Pine State ARC K1CZ	710- 2- 15- 2,634	Zephyrhills Area ARC K4VL (+KC4KUS)	412- 2- 13- 1,784	Jackson Co ARC K8BST	215- 2- 10- 678	Natchaug ARC N1EBY (+N1FNV)	978- 2- 23- 2,890	Burlington Co RC K2KED (+W2ASXD)	1809- 2- 31- 6,236
Metrocresc ARC KB5A (+N5NXX)	745- 2- 95- 2,626	Tippecanoe Co ARC W9REG	779- 2- 23- 1,782	ITT RIF Design ARC N2HFZ (+KB2HDD)	243- 2- 4- 608	MENNO Net K3SW	937- 2- 17- 2,882	Armadio Gang AA5G3	2130- 2- 35- 6,042
Alford Memorial RC W4BQC (+KC4KOB)	708- 2- 30- 2,624	Ocean-Monmouth ARC K2CQ	576- 2- 12- 1,780	MAS ARC N9K9	243- 2- 6- 592	South Bay ARS K6OHQ (+KB6TPO)	653- 2- 16- 2,862	Wheaton Community RA WB8CU	1861- 2- 20- 5,496
Hawaii West ARS NH6LR	893- 2- 13- 2,610	Ozone ARC KNSY (+KB5ARE)	685- 2- 20- 1,774	Hangtown ARC W6ZJF	252- 2- 6- 504	Susquehanna Co ARC K3SE	575- 2- 10- 2,856	Long Island Mobile ARC K0ZG (+N2IUU)	1434- 2- 132- 5,366
Queen City Emergency Net WBVL (+KB8GFK)	587- 2- 25- 2,610	Stomoshish Co Hams Club W47LAW	755- 2- 22- 1,752			Starford ARC K1GK (+N1FOA)	713- 2- 75- 2,818	Peoria Area ARC W9JUV (+KB9CPG)	1669- 2- 70- 5,342
Kentucky Colonel ARC AB4Y (+KC4KQJ)	562- 2- 25- 2,598	Chesco ARC K3BKG	584- 2- 12- 1,752			Naval Postgraduate School ARC K6LY (+N6UEG)	718- 2- 30- 2,740	Wasvi W4SVI	1362- 2- 20- 4,998
Wichita ARC W8SDE (+KB8DGI)	814- 2- 60- 2,566	Junotau ARC K17GPG	502- 2- 15- 1,750			Key West ARC K3ML	529- 2- 8- 2,654	Monongalia WA K8WV	1589- 2- 30- 4,980
St Charles ARC N0GL (+WB8RA)	742- 2- 26- 2,546	Tioga Co ARC NR3K	369- 2- 22- 1,748			WOLF K2GE	724- 2- 16- 2,566	West Coast ARC W0DX (+KC8CKE)	1383- 2- 62- 4,830
Shore Points ARS NR2D	638- 2- 22- 2,522	Macon ARC W4BKM	554- 2- 31- 1,700			Southington ARS W1EVC	652- 2- 30- 2,554	Organge Co ARC W6ZE	1595- 2- 27- 4,516
Adams Co ARC K9HA	775- 2- 25- 2,516	Henry Co ARC K9TH	332- 2- 11- 1,682			Carriage ARS W4FCT	600- 2- 9- 2,502	Clear Lake, Johnson Space Ctr & IBM ARCs W5RRR	1128- 2- 35- 4,360
Mid-State ARC NV9K (+N9INN)	721- 2- 18- 2,504	Southern Alberta ARC VE6CAM	496- 2- 20- 1,676			Marin ARC W6SG (+N6VAW)	542- 2- 32- 2,488	Sonoma Co ARC W6LJF (+N6ONZ)	958- 2- 20- 4,294
RAGE N2DM	792- 2- 8- 2,500	Mt State Transmitters K8VNO	334- 2- 12- 1,628			Allegan Co ARC N8DAG (+KB8FMX)	835- 2- 17- 2,486	Kitchener-Waterloo ARC VE3C	1485- 2- 18- 4,290
Bloomfield ARC W1GWA	739- 2- 11- 2,476	Houston Echo Soc W9XZ	517- 2- 14- 1,616			NBDAG (+KB8FMX)	835- 2- 17- 2,486	AR Fellowship N8MC	1065- 2- 17- 4,174
Jefferson Co RAC W82YCA	688- 2- 25- 2,466	Kenahoochee ARC KD4BB (+N4POK)	428- 2- 12- 1,606			BRATS W3DZO	800- 2- 30- 2,456	Danville ARS W4MAV	1414- 2- 15- 4,054
Larkfield ARC W42PNU (+N2HGU)	684- 2- 25- 2,464	Sierra ARC AA6FE (+KB6ZOO)	334- 2- 25- 1,548			W7OEK (+KB7FMC)	815- 2- 26- 2,444	Northchastle ARS W1GZ (+W1AKCP)	1312- 2- 22- 4,028
Las Vegas RAC K7SN	854- 2- 52- 2,450	Nwal Research Lab ARC W3CW	310- 2- 19- 1,538			Lincoln ARC K9KVK	674- 2- 50- 2,308	Algonquin ARC N1BHI (+K1ATOK)	1173- 2- 18- 3,910
Santa Clarita ARC W6JW (+N6OHJ)	873- 2- 40- 2,450	Soiland ARC K8AAR	375- 2- 20- 1,518			Massasoit ARC W61FLD (+W61CNX)	71- 2- 25- 2,306	Steel City ARC W3KWH	1172- 2- 18- 3,770
W8TD (+N8NF)	817- 2- 14- 2,442	High Plains ARC W0LHA	608- 2- 9- 1,516			W61FLD (+W61CNX)	71- 2- 25- 2,306	Southern California ATS W6BLRU	1379- 2- 20- 3,758
FUBAR AF5M	670- 2- 20- 2,440	Delaware Valley OMK & Elec Comm Assn W6GAR	522- 2- 23- 1,516			Sabine Parish ARC K5ABA	795- 2- 9- 2,200	Mt Vernon ARC N4BV (+KC4GCO)	1059- 2- 40- 3,730
Orange Co ARC W2EH	887- 2- 20- 2,438	Lake Area Radio Klub W0UL	373- 2- 20- 1,494			Temiskaming ARC VE3CTT	489- 2- 10- 2,172	Big Bear ARC W6AT (+KC6DSX)	1000- 2- 21- 3,658
Grant Co ARC W9EBN (+N9GTL)	700- 2- 25- 2,426	Jamestown ARC W0FX	297- 2- 15- 1,488			RAY-Clay ARC K0EY (+KB0CZP)	659- 2- 24- 2,170	N4VA (+N2GBB)	1101- 2- 40- 3,524
Marple Newtown ARC W3US (+K33QK)	527- 2- 31- 2,422	Wilson ARC W4AMFJ	243- 2- 6- 1,486			WACOM W3B1T (+K33UGT)	543- 2- 26- 2,160	Alexandria RC & Arlington ARC W4HFH (+N4HCPC)	871- 2- 40- 3,350
ESL Radio Sporting Club AA6FI (+N6IV)	542- 2- 10- 2,418	Chemung Co ARES W2ZJ (+KB2GMC)	266- 2- 22- 1,444			Sacramento ARC & Hewlett-Packard ARCS W20T (+N2UTP)	620- 2- 17- 2,160	Midland ARC W8KEA (+N8KRT)	930- 2- 40- 3,336
Charlotte ARS KC4K (+W43DUX)	515- 2- 20- 2,376	South West AR RC N5KIG (+N5NMC)	329- 2- 20- 1,432			Parmouthouth RC K8CLB (+N8HVH)	637- 2- 20- 2,140	Starved Rock RC W9MKS	821- 2- 10- 3,290
Granite State ARC K1RD (+N1GICU)	718- 2- 33- 2,376	Milwaukee RAC W9RA	475- 2- 17- 1,428			Dalton ARC K4KLL (+K4CHUR)	617- 2- 48- 2,128	Brantford ARC VE3BA	1100- 2- 25- 3,224
Holland ARC K9DAA	985- 2- 25- 2,392	CO ARS W9INX (+K9AZNN)	812- 1- 35- 1,407			Lebanon Valley HRA N3JG	599- 2- 15- 2,066	Tulsa ARC W5OK	991- 2- 20- 3,166
Pennyrroy ARS W4ZVL	616- 2- 7- 2,266	National Trail ARC K9UZX (+K99CQW)	403- 2- 11- 1,398			St Aug ARS W4AB	468- 2- 23- 2,058	W8VTD (+K8ZSO)	867- 2- 12- 3,118
Mid-Ohio Valley ARC W8FU (+N8KVV)	740- 2- 20- 2,262	Shoreline ARC W1BC	370- 2- 12- 1,368			Island Co ARC W7PN	398- 2- 17- 2,028	Coastline ARC NC1D	1077- 2- 75- 3,000
Muscantine ARC KEBY	672- 2- 19- 2,244	Randolph Co Amateurs WB9NF	422- 2- 25- 1,364			Onbnaire ARC N3JG (+K3ZTWZ)	406- 2- 26- 1,984	Intermountain ARC W6LKV	908- 2- 23- 2,956
Cambridge ARC W8VP	619- 2- 17- 2,236	Albert Leu ARC N9XC	294- 2- 10- 1,348			Rebels ARC W6GX (+KB7GNJ)	492- 2- 9- 1,884	Sun Country ARC N4KIM	768- 2- 9- 2,766
Umpqua Valley ARC K6WOF (+N7JNJ)	558- 2- 15- 2,208	Southern Counties ARC K2BF	319- 2- 20- 1,326			Refugio Co ARC K5ZOD	459- 2- 18- 1,772	Champaign Logan ARC W8EBG	708- 2- 35- 2,742
Laurel ARC N3GPR	689- 2- 25- 2,208	Whitman ARC W4TNP	294- 2- 14- 1,326			Salem ARS N5TJ (+N5TJW)	437- 2- 12- 1,746	Delaware ARC W3SL	625- 2- 10- 2,680
Ucluelet ARC VE7UEP	526- 2- 10- 2,198	Redwood ARC N6AFT (+K6CFF)	320- 2- 9- 1,318			NSN	615- 2- 9- 1,732	Victor Valley ARC K6QWR (+K66DVU)	866- 2- 35- 2,588
Miami Co ARC K3ZVE	520- 2- 16- 2,150	Nutley ARS W2GZ	386- 2- 10- 1,302			North Bay ARC K6LI	419- 2- 7- 1,722	Sierra ARC W4BYBN	659- 2- 19- 2,490
Sudbury ARC VE3BLZ	801- 2- 25- 2,146	Lake Success RC W2YKQ	346- 2- 14- 1,292			Laurel ARS K6QZ	549- 2- 14- 1,670	Mt Tom ARC N4TV (+K41SWK)	709- 2- 20- 2,278
Brandon ARS K4TN	608- 2- 21- 2,132	Pearl River Co ARC W6WU	310- 2- 32- 1,290			Hazel Park ARC W6JXU (+KB8CRM)	490- 2- 20- 1,586	Cedar Creek ARC N5JL	420- 2- 40- 2,268
CRA de L'outaouais VE2CRO	911- 2- 50- 2,122	AR & RC of Luna Co N5JNA	272- 2- 14- 1,288			Pilot Knob ARC N0SF	371- 2- 14- 1,578	Idaho Soc of RA K7ZLL	580- 2- 25- 2,216
PHD ARC W4BUDU (+KB0EQR)	559- 2- 27- 2,112	Pueblo Ham Club K9RK	433- 2- 12- 1,266			Fayette ARC K6QZ	307- 2- 10- 1,514	Three Generations W6SGJ	423- 2- 12- 2,114
RPI ARC & Rensselaer W2SZ (+KB2GPK)	579- 2- 18- 2,106	Bill Grenillion Memorial ARC K4SEX	567- 2- 12- 1,262			Triad ARC K4COP	398- 2- 6- 1,430	Silverton ARC K0TX (+KB7HXE)	698- 2- 16- 2,056
Headwater ARC K8JUV (+K8BERS)	724- 2- 7- 2,106	Wood Co ARC K9TH	268- 2- 12- 1,254			Highlands Co ARC W6AM	337- 2- 18- 1,732	Clallan Co ARC W7FEL	504- 2- 20- 1,888
Del Norte ARC NK6Z	772- 2- 10- 2,092	Geraldine & District ARC VE3KRX	301- 2- 4- 1,222			Panoramaland ARC W7TJ	260- 2- 10- 1,342	Turlock ARC W6BXH	405- 2- 21- 1,874
Vintage RC N6VY	565- 2- 3- 2,090	Ottawa ARC W6QW	248- 2- 3- 1,196			Footfalls ARC N4GTG	136- 2- 6- 1,336	Beaver Valley ARC W3SGJ	417- 2- 15- 1,666
Tri-State ARC W8VA	528- 2- 20- 2,088	Blue Valley ARC W4OHU	329- 2- 31- 1,176			Grays Harbor ARC W7ZA	527- 2- 12- 1,304	Jefferson Barracks ARC K0ZFK	502- 2- 44- 1,648
South Bay ARC N6BFO (+N6QWF)	576- 2- 42- 2,072	Beloit ARC W4E2T	387- 2- 5- 1,174			Lambton Co RC VE3JG	337- 2- 20- 1,282	Prescott ARC K7AA	408- 2- 14- 1,516
NORAC VE7NOR	471- 2- 8- 2,060	NGC K0X5H	265- 2- 3- 1,174			Kokomo ARC K9KI	285- 2- 20- 1,270	Amador Co ARC N6KO	241- 2- 28- 1,470
Fallbrook ARS N5TRS	617- 2- 16- 2,060	Washington Co ARC K4SHM	215- 2- 16- 1,130			Cinclair ARC N5SF	155- 2- 4- 1,234	Palestine/Anderson Co ARC K5SOD (+K5JHW)	187- 2- 20- 1,320
Pearland ARC N5FLS (+W5TSN)	449- 2- 15- 2,058	NGC W47HL (+W57HRU)	211- 2- 6- 1,126			Talawanda HS ARC W9BPTN	327- 2- 4- 1,086	Catskill Mt ARC K0ZH (+W42GCK)	253- 2- 10- 1,306
Salem ARC W7SAA (+K7DRB)	382- 2- 17- 2,056	Cumberland ARC K3IEC	455- 2- 12- 1,084			Calabas ARS W6YGA	216- 2- 17- 1,058	Michiana ARC W9AB	235- 2- 20- 1,276
Clinton ARC W8CS (+N8KLS)	572- 2- 20- 2,054	Yellow Thunder ARC W69FDZ	197- 2- 15- 1,066			Fulton Co ARC K8BXQ	214- 2- 25- 928	Yakima ARC W7AQ	221- 2- 10- 1,262
Chippewa Hills ARC W8EL	720- 2- 7- 2,050	Gratiot Co ARC W4BAEG	311- 2- 9- 1,060			Parmia RC K8UZW	184- 2- 18- 904	Party ARC K6JYK	354- 2- 6- 1,222
Fi George ARC VE7FG	1099- 1- 20- 2,018	NGC K07CO	327- 2- 13- 1,048			Cenois ARC K9HG	180- 2- 16- 860	South Waterloo ARC VE3VA	286- 2- 10- 1,176
Pawnee ARC AF9N	431- 2- 20- 1,990	Hualapai ARC W57T	302- 2- 7- 1,044			Wheat Straw ARC W4SIP	41- 2- 8- 782	Christian Co ARC N79Q	110- 2- 9- 846
Kinston ARS W4DIX (+K4BGE)	552- 2- 19- 1,980	Butler Co ARC W3UDX	268- 2- 7- 1,036						
Boonville ARC KE2DX (+K42SJG)	347- 2- 8- 1,962	Caddoe Creek Contesters W6CZT (+N5NAT)	307- 2- 9- 1,030						
Mammoth Cave ARC K4DSS	469- 2- 16- 1,960	Bedminster ARC K2RIB	352- 2- 10- 1,028						
Mankato ARC W6WCL (+K40EEK)	458- 2- 23- 1,932	Southern Central CT ARC W1GB	505- 2- 12- 1,010						
S Hills Brass Pounders and Modulators K3WNX	586- 2- 30- 1,928	Hamilton Co AR K8KWO	175- 2- 8- 950						
Kansas City ARC K0BK (+N0KCP)	649- 2- 25- 1,916	SEMO ARC K6CEA	215- 2- 25- 940						
Honeywell ARC W49NLP	403- 2- 17- 1,892	Stream ARC K9CAU	113- 2- 8- 926						
Missionary Radio Network K6JRB	836- 2- 12- 1,892	Norville ARC VE3AKQ	47- 2- 15- 912						
NGC W8CEV	563- 2- 17- 1,880	North Shore ARC VE3NSR	301- 2- 12- 902						
WARE NG3Z	504- 2- 10- 1,878	Quik Co ARC K3PS	253- 2- 25- 878						
21 Repeater Group Club W9WM	693- 2- 13- 1,838	Benton and Marshall Co ARES Group N5LFA (+K5FLC)	81- 2- 3- 874						
Dauphin ARC VE4NUF	465- 2- 10- 1,836	Longview Ranch RC VE4DQ	382- 2- 6- 854						
Kansas Nebraska RC W8TQ	328- 2- 20- 1,832	Bluescape ARC K4BRP	267- 2- 7- 834						
Iving ARC K0SG (+N5MFH)	544- 2- 22- 1,828	Fierlands ARC NIBG	274- 1- 27- 793						

BARS					
NW9K (+KB9CJQ)	2317	2	30	7,620	
N Florida ARS					
W4IZ (+KC4GLM)	2626	2	75	7,144	
Four Lakes ARC					
WSJZ (+KA9TNG)	1706	2	24	5,794	
Billerica ARS					
KS1A (+KA1QCL)	1395	2	15	5,260	
Middlesex ARS					
W1EDH (+KA9UMR)	1676	2	31	5,192	
Catalina RC					
N7WS	1602	2	18	5,072	
Central NH ARC					
N1LT	1293	2	20	4,950	
Kalamazoo ARC					
W8VY (+KB8HBU)	1291	2	38	4,808	
Central MA ARS					
W1BIM	1186	2	35	4,318	
Vienna Wireless Soc					
K4HTA	1206	2	40	4,118	
Peninsula ROS					
NT3J	1359	2	29	3,874	
SMARS					
W8DF (+KB8EJD)	1120	2	58	3,818	
Birmingham ARA					
W2COW	883	2	18	3,810	
Iroquois Ford ARS					
WB9TAH	1287	2	15	3,770	
AR-SAR-BEN ARC					
W8BQ (+KB8EPE)	1092	2	25	3,740	
Brazos Valley ARC					
W4JB (+NSG2W)	947	2	75	3,712	
Durango ARC					
W8S (+N6UTE)	1047	2	15	3,376	
NBARC					
W4JMS (+N4PPD)	783	2	45	2,932	
MPARC/FVRA					
K6GIP (+N6NWW)	895	2	21	2,788	
San Francisco ARC					
W6PW	600	2	20	2,668	
Pymatung ARC					
N3B	842	2	8	2,584	
Dual Banders					
W2BAG (+KB2EGG)	788	2	7	2,446	
Susquehanna Valley ARC					
NR3U (+N3FOV)	663	2	15	2,348	
AREA & Markham ESDA					
KE5X	551	2	20	2,308	
FL Lewis ARC					
W2USA	543	2	8	2,296	
Bellevue ARC					
W0WVY	457	2	11	2,244	
South Orange ARA					
W5SS (+KA6TND)	472	2	15	2,030	
Mobile Sixers RC					
W3AWA	473	2	13	1,848	
2019 ARC					
W8BOO	483	2	30	1,788	
RA of Erie					
W3GV	281	2	26	1,748	
Kimberling ARC					
NQOG	359	2	10	1,746	
Burlington ARC					
VE3RAB	286	2	18	1,566	
Mid MI ARC					
NQ8T	245	2	10	1,190	

Toledo RAC					
N8DGZ	375	2	14	1,946	
9A Battery					
Scarborough ARC					
VE3WE	536	5	64	4,795	
9A					
Agawam CD & HCRA					
W1NY (+KA1TMV)	4994	2	36	15,100	
San Antonio RC					
W5SC	1840	2	54	6,196	
Triple "A" ARA					
AC3J	1334	2	45	4,568	
Ontario Ontario ARC					
VE3SAU	894	2	11	3,250	
Interstate RS					
KX1T	419	2	51	2,078	
10A					
Woodbridge Wireless					
W4Y (+KC4FUE)	4127	2	50	12,660	
South Jersey RA					
K2AA (+KB2EUC)	3946	2	40	12,582	
Waminster ARC					
K3JA (+KA3OKS)	3491	2	70	11,334	
Utica-Shelby ERC					
W8BQ (+N8KVS)	2963	2	140	8,176	
Silver Springs RC					
K4SGO	1866	2	36	6,658	
OPARC					
NU4Y (+N4OOF)	590	2	35	3,016	
11A					
Kern Co & Central Valley ARCs					
W6LIE	766	2	25	3,476	
Clearwater & St Petersburg ARCs					
NR5BC	1554	1	110	3,357	
El Dorado Co ARC					
W6AJJ (+KB6VEA)	610	2	25	2,980	
12A					
NGC					
VE3CRC	1238	2	27	4,240	
14A					
Norton ARC					
VE3NAR	2098	2	25	6,568	
15A Battery					
Nashua ARC					
N1NH (+KA1SIE)	2710	5	75	20,810	
17A Battery					
Conejo Valley ARC					
K6CAB (+N6TZU)	3119	5	40	23,685	
23A Battery					
TDXS					
K5DX (+NS4HHS)	3326	5	28	25,260	
24A Commercial					
Englewood ARA					
K2ND	106	2	10	626	

1B-1 op Commercial					
KJ8I	522	2	1,906		
WDBS	440	1	589		
WB8WFK	112	2	224		
WB5CIT	9	2	38		
1B-2 ops Battery					
K6ES (+WB2EHY)	764	5	4,960		
WQ2D (+WB2BHC)	417	5	4,470		
W7EL (+K7JPT)	376	5	4,060		
N8AGU (+WA8RUF)	402	5	3,855		
NK1I (+N1FJ)	337	5	3,530		
N1EVR	311	5	3,210		
K6EJL (+WB5IKP)	321	5	3,120		
VE3OS (+VE3FUI)	411	5	3,100		
WB8FX (+WA8ZPT)	304	5	2,940		
AA6DT (+W86KRN)	297	5	2,895		
K7VYY (+N7KCP)	248	5	2,770		
N7IR (+N7KLT)	288	5	2,720		
NSAE (+KF5OE)	286	5	2,035		
VE3HIE (+VE3OBS)	165	5	1,850		
WB8TSV (+WB8UUD)	235	5	1,780		
NA8Z (+N7B)	121	5	1,410		
KD2DH (+AJ8T)	120	5	955		
W8WZ (+WB5RIC)	106	5	945		
WB8LY (+KA8JWC)	796	2	2,100		
N8B9W (+KB8DTR)	156	5	780		
ND8P (+WA9BLK)	43	5	355		
1B-2 ops					
W8TK (+WD8AUB)	1253	2	5,322		
N7AZ (+WB7SRC)	1315	2	4,432		
N9DJ (+N9NE)	1032	2	3,224		
K7L (+WB7Y)	1218	2	3,088		
W8VZ (+WA8XGA)	729	2	3,016		
W9LNL (+N9ALC)	704	2	2,868		
N9YC (+KB9X)	643	2	2,832		
K4HAV (+WD4NE)	1023	2	2,428		
K8RYU (+K8ZYT)	734	2	2,424		
AD7L (+K7WDM)	576	2	2,424		
K06P (+WB8LDJ)	1136	2	2,372		
W5SG (+W5AGV)	1022	2	2,244		
WE2Y (+WB2GWA)	564	2	2,234		
N2EY (+WA3UZI)	571	2	2,216		
W1FEA (+KC6EPU)	589	2	2,006		
VE2QST	359	2	2,016		
VE2S (PB WH ops)	658	2	2,000		
W1TZ (+N7LPE)	653	2	1,724		
N8LS (+N8OS)	489	2	1,632		
AA5EQ (+KB5CUS)	667	2	1,592		
WB3KAS (+KA3AH)	439	2	1,410		
K3USV (+WB2ESR)	320	2	1,306		
W1TL (+N6AZD)	400	2	1,310		
KABES (+KA7WZM)	378	2	1,156		
NR2R (+KB2EN)	354	2	1,038		
NW1S (+N1GLJ)	270	2	1,018		
W7ACA (+W7JHS)	143	2	772		
NY7E (+K7CAW)	288	2	712		
W1JRP (+N7JZJ)	301	2	702		
W6PDS (+KB2NF)	147	2	694		
N1EXA (+KA1EO)	173	2	546		
KB2XP (+KB2ALL)	209	2	512		
W7NCL (+WB7NRC)	41	2	488		
W1SE (+N4OZD)	148	2	472		
N1HJ (+WA1QCB)	139	2	458		
WB5Y (+N4VYT)	128	2	456		
K8WUC (+WB6PW)	64	2	328		
NU8Q (+KA8CWV)	56	2	258		
K4TPDH (+KB7AL)	75	2	256		
KASB (+KC4UC)	49	2	244		
W1RTZ (+N7LQK)	47	2	202		
1B-2 ops Commercial					
WE9L (+KB5IED)	608	2	1,326		
W1HBP (+WB1FAW)	386	2	872		
2B-1 op					
WA6RND	202	2	1,204		
2B-2 ops Battery					
N8MBY (+WB6UER)	290	5	2,320		
N6PFK (+WB6W)	102	5	1,360		
K7RK (+N8FEG)	120	5	1,335		
W7BYJ (+W7KJ)	124	5	1,080		
KC2J (+W2ER)	66	5	960		
2B-2 ops					
K8GIV (+KB8QI)	1143	2	4,160		
KJ8FD (+KB8NLO)	455	2	1,312		
K6BXI (+W1EJ)	343	2	1,282		
NSLH (+N5LQO)	433	2	1,266		
AF8Z (+WB8BZV)	405	2	1,228		
W7YK (+KA9UDA)	413	2	1,194		
KAGOTU (+N9BUB)	274	2	1,102		
N2IHI	401	2	1,002		
WB5OAP (+WB5OAO)	165	2	992		
AA4GB (+N4GBR)	381	2	962		
KOPS (+KB4AM)	105	2	802		
WA3KEY (+WB3CUU)	179	2	642		
WB5TTG (+WB7UGB)	170	2	540		
KAC2PB (+N2HEC)	57	2	314		
3B-1 op					
W9WI	56	2	738		
5B-2 ops					
WB7QIE (+WB8Z)	272	2	1,212		
Mobile Stations					
1C					
N2BA	446	5	2,185		
W5GN	1258	5	4,340		
AA6DP	810	2	4,744		
N06B	307	5	2,135		
K1WGM	323	2	1,292		
K7SDW	74	5	740		
VE3DH	217	2	3,466		
KG5E	213	2	426		
K4AYLD	85	2	425		
WA6ZTV	180	2	380		
N8N	133	2	278		
WB8OZK	129	2	1,258		
W7ON	125	2	250		
WB1GCM	114	2	236		
KB4MIL	118	2	236		
WB7VHT	107	2	214		
K5LQJ	102	2	204		
WD9EGW	44	2	176		
WE8	55	2	156		
N7LOD	67	2	134		
NX9T	60	2	120		
KJ8NO	57	2	114		

K8HP	47	2	2	94	
W7VIH	33	2	1	2	
KI8M	43	2	1	86	
KB2C	34	2	1	68	
ND7V	27	2	2	54	
NB8DPJ	9	5	1	45	
N9HZU	14	2	2	28	
2C					
N6DD	650	2	12	1,382	
3C					
NB8AO	23	5	8	120	
4C					
WD9DBL	200	2	4	480	
Home Stations					
Commercial Power					
K1D	934	2	1	2,824	
WD4AHZ	666	2	1	2,416	
KB5GEO	1137	2	2	2,274	
K8RV	796	2	2	2,100	
AL7JP	958	2	4	2,024	
NJ9C	644	2	2	2,008	
KD7E	542	2	1	1,950	
K3GWA	426	2	1	1,704	
WR8S	530	2	1	1,662	

Rules, ARRL 10-Meter Contest

1) Object: For amateurs worldwide to exchange QSO information with as many stations as possible on 28 MHz.

2) Contest Period: Second full weekend of December (December 9-10, 1989). Starts 0000 UTC Saturday; ends 2400 UTC Sunday. All stations operate no more than 36 hours out of the 48-hour period. Listening time counts as operating time.

3) Categories

(A) **Single operator:** One person performs all operating and logging functions. Use of spotting nets (operator arrangements involving assistance though DX-alerting nets, etc) is not permitted.

(1) Mixed mode (phone and CW)

(2) Phone only

(3) CW only

(B) **Multioperator:** Single transmitter, mixed mode only. Those obtaining any form of assistance, such as relief operators, loggers or use of spotting nets.

4) Contest Exchange

(A) W/VE₁ stations (including KH6/KL7) send signal report and state or province (District of Columbia stations send signed report and DC). Novice and Technician stations sign /N or /T.

(B) DX stations (including KH2/KP4, etc) transmit signal report and serial number starting with 001.

(C) Maritime or aeronautical mobile stations send signal report and ITU Region (1, 2 or 3).

5) Scoring

(A) **QSO points:** Count two points for each complete two-way phone QSO. Count four points for each two-way CW QSO. Count eight points for CW QSOs with US Novice or Technician stations signing /N or /T (28.1 to 28.3 MHz only).

(B) **Multipliers:** Fifty US states (plus District of Columbia), Canada (NB—VE1, NS—VE1, PEI—VE1 or VY2, PQ—VE2, ON—VE3, MB—VE4, SK—VE5, AB—VE6, BC—VE7, NWT—VE8, YUK—VY1, NF—VO1, LAB—VO2), DXCC countries (except the US and Canada), ITU regions (maritime and aeronautical mobiles only) per mode (phone and CW).

(C) **Final Score:** Multiply QSO points by total multipliers (the sum of states/VE call areas/DXCC countries/ITU regions per mode). Example: W1XX works 2245 stations including 1305 phone QSOs, 930 non-Novice CW QSOs, 10 Novices CW QSOs, for a total of 6410 QSO points. He works 49 states, 10 Canadian call areas, 23 DXCC countries and a maritime mobile station in Region 2 on phone and 30 states, 8 Canadian call areas, and 19 DXCC countries on CW for a total multiplier of 140. Final score = 6410 (QSO points) × 140 (multiplier) = 897,400 points.

6) Miscellaneous

(A) Call signs and exchange information must be received by each station for a complete QSO.

(B) No cross-mode contacts; CW QSOs must be made below 28.3 MHz.

(C) Single-operator mixed-mode and multioperator stations may work stations once on CW and once on SSB.

(D) Your call sign must indicate your

Sample 10-Meter Contest Exchanges

Phone

CQ Contest CQ Contest

From Kilo Alfa Five Whiskey Mike Juliett

KA5WMJ

November Seven India Papa Golf

N7IPG Thank you

You're 59 Texas

Roger, you're 59 Utah
N7IPG

QSL, QRZed

KA5 Whiskey Mike Juliett

CW

CQ Test CQ Test

DE KA5WMJ KA5WMJ/N

DE N7IPG/T

N7IPG/T

599 TX

R 599 UT N7IPG/T

R TU KA5WMJ/N QRZ

Contest Branch now accepts entries on disk!

The Contest branch can now accept contest logs on floppy diskettes. The disk must be IBM compatible, MS-DOS formatted (3½- or 5¼-inch sizes). All log information must be in a true ASCII file. Summary sheets should be in a separate ASCII file.

The log file should follow the layout of the official contest forms (containing band, mode, date, time in UTC, exchange sent, exchange received, multipliers and points). Remember to include your "report sent." Each submitted log should be on a separate diskette.

DXCC country (K6LL in Arizona need not send K6LL/7, but K1JD in Hawaii must send K1JD/KH6).

(E) One operator may not use more than one call sign from any given location during the contest period.

(F) All entrants may transmit only one signal on the air at any given time.

(G) The use of non-Amateur Radio means of communication (eg, telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of this announcement.

(H) A transmitter used to contact one or more stations may not subsequently be used under any other call during the contest period (with the exception of family stations where more than one call is assigned by FCC/DOC).

7) Reporting

(A) Official forms are recommended (available from ARRL HQ for an SASE with two units of first class postage or 4 IRCs).

(B) Logs must indicate time in UTC, mode, call and exchange for each QSO. Multipliers should be clearly marked in the log the first time worked. Entries with more than 500 QSOs must include cross-checking sheets (dupe sheets).

(C) Postmark your entry by January 10 1990.

8) **Awards:** A certificate will be awarded to the highest-scoring single-operator station (in each category) from each ARRL/CRRL Section and DXCC country. The top scoring Novice/Technician station (in each category) in each ARRL Section will be awarded certificates. Top multioperator entries in each ARRL Division, Canada and each continent will receive certificates. Additional certificates will be awarded as participation warrants.

9) Condition of Entry

(A) Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

(B) **Disqualifications:** Excess duplicates and call sign/exchange errors. See January 1989 QST for complete details.

QST

Rules, ARRL 160-Meter Contest

1) **Object:** For amateurs worldwide to exchange information with W/VE amateurs on 1.8-MHz CW only. DX-to-DX QSOs are not permitted for contest credit.

2) **Contest Period:** 2200 UTC December 1 until 1600 UTC December 3. Forty-two-hour period with no time limitation.

3) Categories

(A) **Single operator:** One person performs all transmitting, receiving, spotting and logging functions.

(B) **Multioperator:** Single transmitter only. Those obtaining any form of assistance, such as relief operators, loggers or use of spotting nets.

4) Contest Exchange

(A) W/VE: Signal report and ARRL/CRRL Section.

(B) DX: Signal report. Country name is obvious from the prefix. Send ITU Region if maritime or aeronautical mobile.

5) Scoring

(A) **QSO Points:** Two points for QSOs with amateurs in an ARRL/CRRL Section. W/VE stations count five points for DX QSOs.

(B) **Multipliers:** ARRL/CRRL Sections plus VE8/VY1 (maximum of 77) and DXCC countries (W/VE participants only).

(C) **Final Score:** Multiply QSO points by multiplier. Example: K1MM works 357 stations, including 13 DX stations, and has a multiplier of 67. His score would be 753 QSO points $[(344 \times 2) + (13 \times 5)]$ multiplied by 67 for 50,451 points.

6) Miscellaneous

(A) Participants are reminded that 1.830 to 1.850 MHz should be used for intercontinental QSOs only, in conformance with ARRL band plan.

(B) The use of non-Amateur Radio means of communication (eg, telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of this announcement.

7) Reporting

(A) Official forms are recommended (available from ARRL HQ for an SASE or two IRCs).

(B) Logs must indicate mode, date, time in UTC, call, full exchange (sent and received) and QSO points. Multipliers should be clearly marked in the log the first time worked. Entries with more than 200 QSOs must include cross-check sheets (dupe sheets).

(C) Postmark your entry by January 3, 1990.

8) **Awards:** A certificate will be awarded to the top-scoring single-operator station in each ARRL/CRRL Section and DXCC country,

and to the top-scoring multioperator stations in each ARRL Division and continent.

9) Condition of Entry

(A) Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

(B) **Disqualifications:** Excess duplicates and call sign/exchange errors. See January 1989 QST for complete details. **QST**

W1AW Schedule

October 29, 1989—April 1, 1990 MTWThFSSn = Days of Week Dy = Daily
W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice Fast Code Practice CW Bulletins Teleprinter Bulletins Voice Bulletins	MWF: 0300, 1400; TThS: 0000; TThSSn: 2100; Sn: 0300 MWF: 0000, 2100; TTh: 0300, 1400; S: 0300; Sn: 0000 Dy: 0100, 0400, 2200; MTWThF: 1500 Dy: 0200, 0500, 2300; MTWThF: 1600 Dy: 0245, 0545
EST	Slow Code Practice Fast Code Practice CW Bulletins Teleprinter Bulletins Voice Bulletins	MWF: 9 AM, 7 PM; TThSSn: 4 PM, 10 PM MWF: 4 PM, 10 PM; TTh: 9 AM; TThSSn: 7 PM Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM Dy: 6 PM, 9 PM, 12 PM; MTWThF: 11 AM Dy: 9:45 PM, 12:45 AM
CST	Slow Code Practice Fast Code Practice CW Bulletins Teleprinter Bulletins Voice Bulletins	MWF: 8 AM, 6 PM; TThSSn: 3 PM, 9 PM MWF: 3 PM, 9 PM; TTh: 8 AM; TThSSn: 6 PM Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM Dy: 8:45 PM, 11:45 PM
MST	Slow Code Practice Fast Code Practice CW Bulletins Teleprinter Bulletins Voice Bulletins	MWF: 7 AM, 5 PM; TThSSn: 2 PM, 8 PM MWF: 2 PM, 8 PM; TTh: 7 AM; TThSSn: 5 PM Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM Dy: 7:45 PM, 10:45 PM
PST	Slow Code Practice Fast Code Practice CW Bulletins Teleprinter Bulletins Voice Bulletins	MWF: 6 AM, 4 PM; TThSSn: 1 PM, 7 PM MWF: 1 PM, 7 PM; TTh: 6 AM; TThSSn: 4 PM Dy: 2 PM, 5 PM, 8 PM; MTWThF: 7 AM Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM Dy: 6:45 PM, 9:45 PM

Code practice, Qualifying Run and CW bulletin frequencies: 1.818, 3.5815, 7.0475, 14.0475, 21.0775, 28.0775, 50.08, 147.555 MHz.

Teleprinter bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.

Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

Slow code practice is at 5, 7½, 10, 13 and 15 WPM.

Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 WPM.

Code practice texts are from QST, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from September 1989 QST, pages 9 and 83," indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 83.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Tuesdays and Saturdays at 2330 UTC, Keplerian Elements for active amateur satellites will be sent on the regular teleprinter frequencies.

Teleprinter bulletins are 45.45-baud Baudot, 110-baud ASCII and 100-baud AMTOR, FEC mode.

CW bulletins are sent at 18 WPM.

W1AW is open for visitors Monday through Friday from 8 AM to 1 AM EST and on Saturday and Sunday from 3:30 PM to 1 AM EST. If you desire to operate W1AW, be sure to bring a copy of your license with you.

W1AW is available for operation by visitors between 1 and 4 PM Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

W1AW will be closed on November 23 and 24, December 25, January 1 and February 19.

Contest Branch now accepts entries on disk!

The Contest branch can now accept contest logs on floppy diskettes. The disk must be IBM compatible, MS-DOS formatted (3½- or 5¼-inch sizes). All log information must be in a true ASCII file. Summary sheets should be submitted in a separate ASCII file. The log file should follow the layout of the official contest forms (containing band, mode, date, time in UTC, exchange sent, exchange received, multipliers and points). Remember to include your "report sent." Each submitted log should be on a separate diskette.

Contest Corral

Conducted By Billy Lunt, KR1R.
Contest Manager

NOVEMBER

1

West Coast Qualifying Run, 10-35 WPM, at 0500Z Nov 2 (9 PM PST Nov 1). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3.590 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL HQ for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

4-5

ARRL November Sweepstakes, CW, October QST, p 83.

International Police Assn Radio Club Contest, sponsored by the German Section IPA, from 0700Z-0900Z and 1500Z-1700Z (CW) Nov 4; from 0700Z-0900Z and 1500Z-1700Z (phone) Nov 5. Phone and CW are separate contests. Single op/all band; Multiop/one transmitter; SWL. Suggested frequencies: CW—3.525 7.025 14.060 21.075 28.075; phone—3.775 7.075 14.275 21.275 28.600. Must remain on band for at least 15 minutes. Exchange signal report and serial number. US stations also send state. IPA members send IPA as part of exchange. Count 1 point per QSO with non-IPA members and 5 points per QSO with IPA members. Multiply by sum of IPA countries/states worked per band. Mail entries by Dec 31 to Dietmar Czirr, DF6VX, Schenkendorfstr 69A, D-4950 Minden, West Germany. For further information send SASE to Thomas Jenkins, WA8VDC, 4828 Elm, Newport, MI 48166.

QST QSO Award Party, phone, see Oct QST, p 86.

Ten-Ten International Net Fall CW QSO Party, see Oct QST, p 86.

6

W1AW Qualifying Run, 10-35 WPM at 0300Z Nov 7 (10 PM EST Nov 6). Transmitted simultaneously on 1.818 3.5815 7.0475 14.0475 21.0775 28.0775 50.08 147.555 MHz. See Nov 1 listing for more details.

10-12

Japan International DX Contest, phone, sponsored by *Five Nine Magazine*, from 2300Z Nov 10 until 2300Z Nov 12. Operate a maximum of 30 hours. Rest period must be at least 60 minutes and noted in log. Multioperator stations can operate full 48 hours. 80-10 meters (except WARC bands). Entry classes: single op, single band; single op, multiband; multiop, multiband. No crossband QSOs. Single ops may have only one transmitted signal at any given time. Once operation begins on a band, the station must remain on that band for at least 10 minutes. Listening time counts as operating time. Multiops may have a maximum of one signal per band. JA stations send RS and prefecture number (01-50). Others send RS and progressive serial number starting with 001. Contacts among DX stations or among JA stations do not count. Count 1 point per QSO on 40-15 meters. Count 2 points per QSO on 80 and 10 meters. Multiply by the number of different prefectures worked (max 50) per band for final score. Use separate logs for each band. Mark multipliers the first time worked. Awards and plaques. Provide a complete summary. Enclose SAE and IRC for results. Mail logs to arrive by Dec 31 to *Five Nine Magazine*, Japan International DX Contest, PO Box 8, Kamata, Tokyo 144, Japan.

11

ALARA Contest, sponsored by the Australian Ladies' ARA from 0000Z to 2400Z, Nov 11. Open to all licensed operators as well as SWLs throughout the world. YLs work YLs and OMs. OMs work YLs only. YLs call CQ ALARA Contest and OMs

call CQ YL. Each contact may be counted twice on each band for credit—once for phone and once for CW. No net, list or crossmode operations allowed. ALARA members send RS(T), serial number, ALARA member and name. YL nonmembers or OMs send RS(T), serial number and name. Score 5 points for ALARA members, 4 points for YL nonmembers, and 3 points for OMs. CW contacts double QSO points. All logs must indicate date/time UTC, band, mode, call worked, reports and serial number, name of op worked, and points. Send logs to Mrs Marilyn Syme, VK3DMS, PO Box 91, Irymple 3498, Victoria, Australia.

11-12

European DX Contest, RTTY, sponsored by the Deutscher ARC, from 1200Z Nov 11 until 2400Z Nov 12. Work stations once per band; 3.5, 7, 14, 21 and 28 MHz only. Entry Classes: Single operator, all band; Single operator, High band (14, 21, 28 MHz only); Multioperator, Single transmitter; SWL. Stations must remain on a band for at least 15 minutes, except for a quick QSY to work new multipliers. Single operators may operate a maximum of 30 hours. The 6 hours of off time may be taken in one to three periods and must be noted in the log. Non-EU stations work EU only. Exchange signal report and serial number. W/K stations also give state. Count 1 point per QSO and 1 point per QTC (explained below). Multiply by number of EU countries worked per band. European Country list: C31 CT1 CU EA EA6 EI F G GD GI GJ GM GM-Shetland GU GW HA HB HB0 HV I IS IT JW-Bear JW-Spitsbergen JX LA LX LZ OE OH OH0 OJ0 OK ON OY OZ PA SM SP SV SV5-Rhodes SV9-Crete SY-Athos T7 TA1 TF TK UA-1346 UA2/UZ2F UA1-Franz Josef Land UB UC UN/UA1N/UZ1N UO UP UQ UR Y2 YO YU ZA ZB2 1A0 3A 4U1-Geneva 4U1-Vienna 9H1. The multiplier on 3.5 MHz may be multiplied by 4, the multiplier on 7 MHz by 3, and the multiplier on 14-21-28 MHz by 2. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to an EU station. QTCs may be sent only by non-EU stations to EU stations. A QTC contains the time, call sign and QSO number of the station being reported (eg, 1307/DA1AA/431). A QSO may be reported only once, and not back to the originating station. A maximum of 10 QTCs to the same station is permitted; the same station may be worked several times to complete this quota. Only the original QSO, however, has QSO point value. Keep a uniform list of QTCs sent. For example, QTC 3/7 would indicate that this is the third series of QTCs sent, and that seven QSOs are reported. Awards. List 40 QSOs or QTCs per sheet. Use separate logs for each band. Dupe sheets must be submitted for bands with more than 200 QSOs. Deadline: Dec 15. Mail to WAEDC-Committee, PO Box 1328, D-8950 Kaufbeuren, Fed Rep of Germany.

Montana Centennial QSO Party, sponsored by the Butte ARC from 0000Z Nov 11 until 2400Z Nov 12. Phone and CW. Frequencies: phone—3.890 7.280 14.280 21.370 28.470; CW—40 kHz from low end; Novice—25 kHz from low end. Work stations once per band and mode. CW QSOs in the CW sub-band only. Exchange signal report, serial number, and QTH (county for MT stations, state/prov/country for others). Count 1 point for phone, 2 for CW. W7FO counts 100 points per band and mode. MT stations multiply points by states worked, others by MT counties. Certificates. Mail logs to be received by Dec 12 (include legal-size SASE for results) to Butte ARC, W7FO, PO Box 4036, Butte, MT 59701.

OK DX Contest, sponsored by the Czechoslovakian Central Radio Club from 1200Z Nov 11 until 1200Z Nov 12. Phone and CW. 160-80-40-20-15-10 meters. Categories: single-op, all band; single-op, single band; multioperator, single transmitter, multioperator, multi-transmitter; QRP (single-op); SWL. OK work DX, DX work OK. Exchange signal

report and ITU Zone. OK stations count 1 point for Europeans, 3 points elsewhere. EU/DX stations count 4 points with OK/OL, 2 points with stations in different continent, 1 point in same continent, 0 point for own country. Multiply QSO points by total number of ITU zones worked on each band for final score. Use separate log sheet for each band. Awards. Entries must be postmarked no later than Dec 15 and mailed to Central Radio Club, PO Box 69, 11327 Praha 1, Czechoslovakia.

QST QSO Award Party, CW, see Oct QST, p 86.

18-19

ARRL International EME Competition, see Sep QST, p 84.

ARRL November Sweepstakes, phone, October QST, p 83.

25-26

CQ World-Wide DX Contest, CW, see Oct QST, p 85.

West Virginia QSO Party, sponsored by the WV State ARC, from 1800Z Nov 25 until 1800 Nov 26. Work stations once per band and mode. Exchange signal report and state or province (WV stations send signal report and county). Count 1 point per phone QSO and 2 points per CW QSO. And 25 bonus points for working W8WVA. WV stations multiply QSO points by total of WV counties, states and provinces worked. Others multiply QSO points by WV counties worked. Send logs before Dec 31 to Jimmie Hewlett, WD8MKS, 2207 Fairlawn Ave, Dunbar, WV 25064.

28

W1AW Qualifying Run, 10-35 WPM at 2100Z Nov 28 (4 PM EST Nov 28). See Nov 6 listing for more details.

DECEMBER

1-3

ARRL 160-Meter Contest, see this issue, p 80.

TOPS Activity Contest, sponsored by TOPS International, from 1800Z Dec 2 until 1800Z Dec 3. CW only, 80-meters. Single op stations must take one 7 hour break, multiop stations may operate the entire 24 hours. Classes are single operator, multioperator, and single op-QRP (5 W or less input). Frequencies are 3.500-3.585 MHz. The lowest 12 kHz are reserved for DX contacts. Exchange RST and 3-digit serial number. TOPS members also give their membership number. Count 1 point for QSOs with own country (each call area in W, VE, VK, PY, U and JA counts as a separate country). Count 2 points for QSO with own continent. Count 6 points for each QSO with another continent and count 2 bonus points for QSOs with TOPS member (TOPS members get 3 bonus points for QSOs with other members). For final score, multiply total points by the number of prefixes worked. Send logs before Jan 31 to Helmut Klein, OE1TKW, Nausea-gasse 24/26, A-1160 Wein, Austria.

5

West Coast Qualifying Run, 10-35 WPM, at 0500Z Dec 6 (9 PM PST Dec 5). See Nov 1 listing for more details.

9-10

ARRL 10-Meter Contest, see this issue, p 79.

10

QRP ARCI Holiday Spirits Home-brew CW Sprint, sponsored by QRP ARC International, from 2000Z to 2400Z Dec 10. Entry classes: all home-brew equipment; mixed home-brew/commercial equipment; commercial equipment. CW only. Single band or all band. Work stations once per band. Exchange signal report, HB (home-brew) or C (commercial), state/province/country and QRP number if

member. Nonmembers send power output. Suggested frequencies: 1.810 3.710 3.560 7.110 7.040 14.060 21.110 21.060 28.110 28.060 50.060. Count 5 points for QSO with ARCI member. Others count 2 points for same continent and 4 points for different continent. If station worked is using home brew, add 5 points per QSO. Bonus points for using homebrew equipment (HB): Add 200 points for each band an HB transmitter is used; add 300 points for each band an HB receiver is used; add 500 points for each band an HB transceiver is used. Multiply QSO points by states/provinces/countries worked per band by power multiplier (0-1 W output $\times 10$; 1-5 W output $\times 7$. More than 5-W output counts as checklog. If 100% natural power, multiply final score by 2; if 100% battery, by 1.5. Include description of home-brew equipment and antennas used and indicate which equipment was used on which bands. Awards. Mail entry (SASE for results) before 30 days after the contest to QRP ARCI Contest Chairman, Red Reynolds, K5VOL, 835 Surry Rd, Lake Zurich, IL 60047.

12

W1AW Qualifying Run, 10-35 WPM at 0300Z

Dec 13 (10 PM EST Dec 12). See Nov 6 listing for more details.

27

W1AW Qualifying Run, 10-35 WPM at 1400Z Dec 27 (9 AM EST Dec 27). See Nov 6 listing for more details.

31

Canada Day Contest, sponsored by the Canadian Amateur Radio Federation, from 0000Z to 2400Z, Dec 31. Everyone works everyone. 160-6 meters, phone and CW. Entry classes: Single op; all band mixed mode (phone and CW), all band CW, all band SSB, and single band mixed mode. There are two multiop classes; single transmitter and multi-transmitter. Work stations once per mode on each band. No crossmode QSOs allowed. Exchange name, RS(T), serial number (starting with 001) and province/state/country. VE1 stations must also send province. Multi-multi stations use separate serial numbers for each band. Count 10 points per VE QSO, 4 points for other countries. 20 point bonus for working any CARF station using TCA or VCA suffix. Multiply by total VE provinces worked per

band on each mode (VO1/VO2 VE1-NB VE1-PEI VE1-NS VE2-8 VE0 VY1). Suggested frequencies: 1.810/1.840 3.525/3.775 7.025/7.070/7.155 14.025/14.150 21.025/21.250 28.025/28.500 and 50.040/50.110. Mail logs within 30 days (include SASE or SAE/IRC for results) to CARF Contest, c/o Mr J. Parsons, VE6CB, Acton Corners Rd, Oxford Mills, ON K0G 1S0, Canada.

Computer Diskette Media: Items for this column can now be sent on a standard 5¼- or 3½-inch MS-DOS formatted floppy disk to ARRL HQ. The file must be in an ASCII format and must contain all information as listed below. The file can also be sent via modem to the ARRL Bulletin Board at 203-665-0090.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by Dec 1 to make the Feb issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Strays

CALL FOR SPEAKERS

☐ Have an interesting VHF/UHF topic? The Santa Barbara Amateur Radio Club is looking for speakers for its VHF/UHF Convention on May 5-6, 1990. Topics include VHF/UHF, microwave technology and oper-

ating. Contact Al Soenke, WA6VNN, c/o SBARC, 228 Hillview Dr, Goleta, CA 93117.

QST congratulates...

☐ Vernon L. Garman, Jr, KØEGA, of Cedar Rapids, Iowa, on being the 1989 Rockwell International Engineer of the Year. Vern is active in Navy Marine Corps MARS.

I would like to get in touch with...

☐ former members of the Harvard Wireless

Club. I am preparing an article on the club's history. Gene Simon, W2KOY, Harvard Wireless Club, 6 Linden St, Cambridge, MA 02138.

☐ US Navy Radioman veterans who served on Landing Ship Tanks. Please send name LST number, rate, address, phone number and call sign. Frank R. Prina, N2DLN, Ex-RM2c, LST 931, 116, Woodward, Springville, NY 14141.

Special Events

Conducted By Billy Lunt, KR1R
Contest Manager

Pensacola, Florida: The Serious Hams AC will operate KK4AE from 1700Z Oct 28 until 1700Z Oct 29 commemorating the 103rd anniversary of Geronimo's imprisonment. Operation will be in the General and Novice 40, 20, 15 and 10-meter bands. QSL to Don Camacho, KK4AE, 2269 Berrydale Rd, Cantonment, FL 32533.

Albany, Georgia: The Albany ARC will operate W4MM 1200Z-2400Z Nov 4 in celebration of the 18th annual Mule Day Event. Suggested frequencies: 3.975 7.245 14.250 28.383. For certificate, send large SASE to AARC Inc, PO Box 70601, Albany, GA 31705.

Houston, Texas: The Northwest ARS will operate KG5LZ Nov 4-5, 1700Z-2100Z each day, from the Houston Com-Vent. Operation will be SSB, CW, packet, AMTOR and RTTY in the 20, 15 and 10-meter bands. For QSL, send QSL and SASE to NARS, PO Box 1254, Spring, TX 77383.

Claremore, Oklahoma: Rogers Co Wireless Assn will operate N5OK Nov 4-5, 1300Z-2300Z each day, to celebrate Will Rogers Days. Suggested frequencies are in the lower 15 kHz of the General 20 and 15-meter bands and 28.430. Send QSL and SASE to RCWA, Rte 3 Box 793, Claremore, OK 74017.

Paducah, Kentucky: The Paducah ARA will operate W4NJA 1600Z-2300Z Nov 5 from the White Haven Tourist Center. Operation will be SSB and CW 25 kHz up from the bottom of the General bands. For QSL, send SASE to David Tucker, NU4N, 1500 Massac Church Rd, Paducah, KY 42001.

Bismarck/Mandan, North Dakota: The Central Dakota ARC will operate WØZRT 1500Z-2300Z Nov 5 to commemorate North Dakota's Centennial Celebration. Suggested frequencies: SSB—lower portion of the General 40, 20 and 15-meter bands and Novice 10 meters. For certificate, send QSL,

contact number and business size SASE to CDARC, PO Box 7162, Bismarck, ND 58502.

Butte, Montana: The Butte ARC will operate W7FO Nov 6-12 to celebrate Montana's 100th birthday. Suggested frequencies: 3.890 7.280 14.280 21.370 28.470. For certificate, send 9- \times 12-inch SASE to Butte ARC, PO Box 4036, Butte, MT 59701.

Newington, Connecticut: The Armored Force ARN will operate special-event stations from 0000Z Nov 10 until 2400Z Nov 12 to honor all veterans who are now Silent Keys. Suggested frequencies: phone—3.920 7.283 14.250 21.375 28.640 28.450; CW—7.065 7.125. For certificate, send no. 10 SASE to WB1DWR, 16 Berkeley Cir, Newington, CT 06111.

Turkey, North Carolina: The Onslow ARC will operate WD4FVO 1500Z-2100Z Nov 18 commemorating the third annual Thanksgiving Turkey Talk. Operation will be 25 kHz up from the General band edges, Novice 40-meter CW band and the Novice 10-meter phone band. Send QSL, QSO number and SASE to OARC, PO Box 841, Jacksonville, NC 28541.

Pensacola, Florida: N4PHH will operate Nov 12-18 during Geography Awareness Week. Operation will be on CW 14.060 and SSB 14.250. For certificate, send QSL to Fred Gamble, Dept of Physical Science, Pensacola Jr College, Pensacola, FL 32504.

Norwich, Vermont: The Twin State RC will operate W1FN Nov 18-19 to commemorate its affiliation and opening of the new home of the Montshire Museum of Science. Operation will be on phone and CW in the lower 25 kHz of the General bands and 28.361. For QSL, send QSL and SASE to Twin State RC, c/o Montshire Museum of Science, PO Box 770, Norwich, VT 05005.

Plimoth Plantation, Massachusetts: The Whitman ARC will operate WAINPO 1200Z-1800Z Nov 25

to commemorate the first successful settlement in the New World. Suggested frequencies: 7.290 14.290 21.360 28.350. For certificate, send 9- \times 12-inch SASE to Whitman ARC, PO Box 48, Whitman, MA 02382.

Computer Diskette Media: Items for this column can now be sent on a standard 5¼- or 3½-inch MS-DOS formatted floppy disk to ARRL HQ. The file must be in an ASCII format and must contain all information as listed below. The file can also be sent via modem to the ARRL Bulletin Board at 203-665-0090.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by Dec 1 to make the Feb issue. Please include the name of the sponsoring organization, the call sign of the special-event station, the city location, dates and times (Z), suggested frequencies and QSL information. Requests for donations will not be published.

QSLing Special-Event Stations: To get your QSL or certificate from any of the special-event stations listed here, follow simple guideline. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a self-addressed, stamped envelope. If sending for a certificate, use a 9- \times 12-inch envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your SASE to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-event stations will often print their cards and/or certificates after the operation is over so they will know how many to order.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM: Walt Dabell-KD3GS. ASM: Bill Ryan-WA3DPJ. The Sussex County ARES group participated in emergency operations in August. Volunteers manned the EOC in George-town and Red Cross Shelters in the Frankford area. The area received 15 inches of rain in about 4 hours overnight. Our value to the EOC and to the Red Cross is well established after this job well done. Keep up the good work! There was a Hurricane workshop sponsored by the Sussex County EOC in August. We gave a demo by working a sked with the National Hurricane Center in Miami (via a station in Texas). The Delmarva Hamfest was a great success! Congratulations to the Kent County ARC for one heck of a great job! The Hamfest Committee reports that proceeds from this year's hamfest will be awarded as two scholarships at next year's hamfest. The AWARE club will be awarding a scholarship at their Christmas Dinner December 1st. Looking for something to do with that spare cash in your club treasury? How about donating a package of ARRL books to a local or school library? Aug net rpt: DTN stns 343 tfr 45 in 23 sessions, DEPN stns 43, tfr 9 in 4 sessions, SEN stns 75, tfr 6 in 5 sessions, Traffic: K3YBW 45, WB3DUG 38, KD3GS 33, W3GWIY 30, KA3GRO 21, KQ5G 18, K3JL 12, N3FLD 11, W3FEG 10, Total 218.

EASTERN PENNSYLVANIA: SM, Kay Craigie KC3LM ASM WA3PZO, K3GA, KQ3B, K3ZF2; SEC KB3YS, ACC KCBQB, OOC W3IB, SGL WA3IAD, STM, BM KB3UD; PIO W3ZXV; TC W3FAF. The PA QSO Party is over—now we wait for the results! Hope your score was the best ever. Does your club sponsor an award available to non-members, such as the Reading RC's "Pagoda Award"? If so, please send complete rules to the Section Manager, so we can put together a list for a future EPA FEEDLINE newsletter and help you drum up business. RF Hill ARC presented their "John C. Willard Memorial Scholarship" to N3FIX. Speaking of winners, two Eastern Pennsylvanians received the Foundation For Amateur Radio scholarship this year: KA3FFX and N3CZB. Eastern PA radio organization's activities illustrate many excellent ways to bring ham radio to the public's attention. Warminster ARC originated over 230 messages from their Middletown Grange Fair booth in 1989. Montgomery County ARES EC W3EAG had a ham radio exhibit at a Cheltenham Twp EMS conference. Reading RC presented a lively panel discussion on the local cable TV system's public access channel. Temple University ARC held regular open house at their club station. These are just a few examples of what hams can do to help ourselves. In this month of Thanksgiving, let's do more than give thanks for Amateur Radio—let's reaffirm our individual commitment to make ham radio better, and make it better known. Attention all traffic handlers: When was the last time you coaxed someone to check in to your favorite Section Net, especially someone from an area that's currently unrepresented? Does your club sponsor a VHF net where newcomers can learn traffic handling from you? The ARRL Net Directory contains a lot of good material for those who want to learn and/or teach traffic handling. For more advice, contact STM KB3UD or one of the Section Net Managers: AA3B, WA3EHD, and WB3EPU. The EPAEPTN bunch enjoyed Pocono ARC's hospitality at their fall picnic. KA3SKT is now an ORS. The fall session brought a number of appointment changes in ARES, but the list wasn't ready yet at press time. TC W3FAF brought his talk on vertical antennas to a Mid-Atlantic ARC meeting; John has several excellent presentations on tap, as do his Assistant TC's. For the whole list, contact John at his CBA, Traffic (August): N3AZW 873, N3DRM 361, W3JXK 177, N3CD 129, WA3GJC 123, NM3K 103, AA3B 89, KD3AO 72, W3IPX 63, W3DP 57, W3MD 47, W3ZID 44, KA3SKT 42, K3MVM 41, N3GFC 33, N3NNL 33, N3EFW 27, WB3EVL 26, N3GXX 23, K3UR 23, K3TX 23, K3QYH 19, KO3M 18, K3ARR 14, W3BNR 13, W3ADE 8, W3VA 8, W3ACN 3, W3HK 3. Nets (QNI/QSP): EPA 524/171, EPAEPTN 441/175, PTN 243/84, D6ARES 129/8, D6ARES 61/0, MARCNET 42/2, MARCNET 165/62, SEP/89 29/27, @PBBS: @K3RLI 627, @WA3TSW 420, @WB3JOE 62, @N3ET 4. Thanks for all activities and reports!

MARYLAND—D.C.: SM: Ken Cohen, NI3F; ASM/PKT: KJ3E; ASM/ACC: WA3YLO; BM: NB3P; PIO: N3BMB; SEC: KN3V; TC: W3VVN; STM: N3EGF; SGL: KW3X; OOC: WB3EFG. The race is on for Atlantic Director and Vice Director! Be sure to vote (early and often-hill). Rcvd a warm letter from The Red Cross expressing tnx to all who helped! Response 89' simulated earthquake. MARC assisted with Rotary Runfest for the Fourth year running (hill). Ur Section TC and his ATCs are ready and willing to help Liberal Arts majors (like ur SM) and others with technical questions. KJ3E is sending a non-stop stream of pkt msgs from vacation in Maine using his laptop. W3IWI is in KH6-1and on business! Congrats to the FAIR scholarship winners and to FAIR for hosting such a worthwhile program. Upgrading? Please note that not all VECs will accept certificates of successful completion for theory tests, nor will all accept one minute solid copy as an alternative to the ten question CW exam. Be sure to check with ur examiner first! Traffic (Aug): W3IWI 2187 (BPL), N4QQ 464, KN1K 241, KJ3E 210, NB3P 172, W3FA 172, KC3Y 149, K3RXX 136, K3GHH 115, K3ORW 51, W3YVQ 49, KD0M 46, K3NNI 45, K3USO 36, K1BGT 31, W3DQI 29, K3KF 28, N3EGF 26, W3WDT 20, NF3X 17, N3GII 29, K3GYW 5, KA3DXX 4, W3ZNW 3.

PSHR W3FA 93, KC3Y 87, K3RXX 81, KJ3E 69, W3YVQ 63. **SOUTHERN NEW JERSEY:** SM: Richard Baier, WA2HEB—SEC: K2QJ, STM: WB2UVB, ACC: K2IXE, TC: N2BQT, PIO: K2ZAF, SGL: VACANT, BM: WB2UVB, OOC: WA2HEB. ATCS K2JF, KA2RJA and WB2MNF. VE testing will be given in Bellmawr on Nov. 16. See Jan., 1989 QST column for full info on this session. Also VE testing being run by the DVRA

on Nov. 18, 12:30 PM at the Hopewell Township Branch of the Mercer County Library, W. Delaware Ave. in Pennington. Walk-ins OK, but reservations are strongly suggested. For further info, contact Don Wright, AA2F, at (609) 737-1723. I know I'm getting to sound like a broken record, but we ARE making progress with the "Scanner Law" legislation. In early September, all members of the Senate and Assembly were sent a Fact Sheet and a letter as to why we need the present law repealed. NNJ SM NW2L and I have been working very closely on this, but in order to be successful, we need your help. Please drop your Assemblymen and Senator a line on your QSL card asking their support for S-3593 (Senate), or A-4557 (Assembly). By the time you read this, the Legislature will be about to reconvene after the elections, so the time is NOW! Until next month, 73. Traffic: (from July) NG2R 125, WB2ZJF 109, WB2UVB 104, KB2CDB 25, WA4JRP 20, KA2CQX 16, K4FFM 10, WB2SYJ 5, KA2YKN 1, N2HQL 1 (Aug.) WB2ZJF 353, KB1BD (PBBS) 148, WA2HEB 6.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—Say, wasn't that Voyager II Neptune flyby suppin'? And, there's still more to come! (Galileo, Magellan, AND the parting snapshot from Voyager II of our entire solar system!) Public Service Honor Roll: KG2D N2EIA N2EVG WA2FJ, W2FR W2GJ NN2H KC2HJ W2MTA WB2OEV WB2OWO WB2QIX KA2QOO ND2S NJ3V K2YAI KA2ZNN, August BPL W2MTA WB2OWO. KA2JXI-1 & 2 dual port on 145.01 and 145.05 in St. Lawrence County—FB! The PROS Club Ham of the Year is outgoing Prez W2QFC.

NET	MANAGER	TIME	DAY	FREQ	QNI/QSP/QND
NYSEMO	N2AGO	0900	SUN	3993.5	084/009/04
NYSR	W2MTA	0930	SUN	3530	011/003/03
NYS/M*	N2EIA	1000	DY	3677	275/228/31
WDN/M*	WB2OWO	1100	DY	146640-R	390/138/31
NY PHONE*	W2MTA	1300	DY	3925	103/071/25
ESS	W2USS	1800	DY	3590	367/062/31
NYPON*	KA2UBD	1700	DY	3913/3925	398/313/31
NYSPTN	KC2WJ	1800	SUN	3925	047/059/31
Lewis Co	WA2OEP	1800	SUN	147015 + R	038/000/04
OCTENE*	WB2HLY	1830	DY	146940-R	570/133/31
QNET	WA2RXX	1830	DY	146910-R	381/001/29
STAR*	KA3SDB	1830	DY	146130-R	249/033/31
WDNE*	WB2OWO	1830	DY	146640-R	445/191/31
NYS/E*	N5MEA	1900	DY	3677	310/250/31
BLUELINE	WA2SEF	2000	DY	147330 + R	205/020/30
JCRACN	NW2O	2000	DY	146700-R	058/022/31
OARC Net	KB2CRQ	2000	Wed	146850-R	069/004/05
TIGARDS	W2MTA	2000	SUN	146760-R	038/009/04
VHF THIN	WB2OWO	2000	TUE	146640-R	047/000/05
Blk River	WB2OFU	2100	DY	146655-R	047/000/05
Oneonta	KB2CRQ	2100	THU	28375	029/000/05
Pathfind	KA2AON	2100	DY	147150 + R	380/002/30
CNYTN*	WA2PUU	2115	DY	147300 + R	291/060/31
OCTENL*	WB2HLY	2130	DY	146880-R	270/052/31
WDNL*	WB2OWO	2130	DY	146640-R	440/136/31
NYS/L*	W2GYW	2200	DY	3677	320/248/31

*NTS Net. Binghamton Area has the Early Bird Net on 146.730 weekdays at 0530 (August QNI = 232) EYE JAY ZED says they chew a lotta fat in a half hour... WB2JZ. Club officers: Rome W4BNY, N2IBD KA2JXA W2SYL. Appointments (OBS): N2DCI. OO report: N2FHT. N2DLN is organizing former Navy Radiomen who served on LST's (Landing Ship Tank), so if you were or know of hams who served on landing type vessels as radiomen, let FK know and get acquainted with the gang, wherever you live in the USA. Western New York is BE-LOW PAR in League Volunteer Counsels. If you are an attorney, why not contact ARRL HQTRS and give a bit back to ham radio? Here's one from the Old Timer (T. O. T.): Referring to a statement by new FCC Chairman Siker about NTIA in support of commercial operations expansion into 220 MHz, T. O. T. says "Is this a change for the better? Alfred Siker did one good thing when he moved from Sikeston, MO to Washington DC. He raised the IQ of both places!" Well, anyway, it's good to have the "non-issue" of code free licenses behind us, hi! Now we shall see what is to "issue" from the Commissioners! Have a great fall and enjoy ham radio as we know it. Traffic: (Aug.) W2MTA 520, WB2OWO 465, NJ3V 341, WA2FJ 294, KC2HJ 254, KA2QOO 241, ND2S 184, K2YAI 176, KG2D 166, N2EIA 161, W2FR 161, WB2NLU 150, NN2H 134, KA2ZNN 120, WB2OEV 113, N2EVG 105, N2DLN 82, WB2QIX 74, W2GJ 65, AF2K 55, N2EVB 32, W2PPS 32, KA2BDB 29, KB2EOQ 26, WB3CUF 18, KE2EA 6, WA2OEP 4, W2PHQ 2. (July) KA2DQA 16, KA2TWY 15, WB3CUF 3.!

WESTERN PENNSYLVANIA: SM, John T. Fleming, NO3M @ NO3M - ASM: KA3OEM @ NM3G. SEC: WA3JFN @ WA7SSO. STM: K3SMB. BM: KC3ET. TC: N3EFN. ACC: AK3J.

NET	QNI	QTC	SESS	KHZ	T/D	MNGR
WPACW	256	138	31	3585	7:00P/D	WA3UNX
WPAPT	220	103	31	3983	6:00P/D	WA3HLN
KFN	114	79	22	3983	1:30P	N3EMD
PFN	165	183	31	3958	5:00P/D	WA3THT
WPA2MTN	274	32	31	14688	8:00P/D	K3BGC
WNP2MTN	611	44	30	14513	9:00P/D	KC3NY

Hello, I am your new SM. I was SCM in June 1978 and was immediately transferred to Detroit. I was transferred back in 1988 and glad to be able to serve you again. I want to thank Otto for his many years of faithful service to the Section and am glad to see him still holding a Section appointment. Bob Husan, KA3OEM, is my Assistant Section Manager. We will be jointly developing a plan for the section with what we hope to accomplish by December, 1990. I plan on creating a section newsletter and distributing it via packet. Watch for the plan in the packet newsletter. Feel free to use the contents in club newsletters. As you can tell, I like packet. We will have to try the develop a stronger core group of traffic handlers to help clear traffic that is listed on the BBS's. If you can help

move these items, please bring the traffic to the local nets and help packet improve its image. Packet makes it nice not to have to meet a fixed schedule, but still be able to process traffic. Please add my name to your club newsletter mailing list. The Radio Assoc of Erie offered their services with the "We Love Erie Days" 10K run. The Pittsburgh area participated in an NDMS drill involving more than 50 hams under the direction of N3DOS. Ham radio served three functions, one of "shadowing" NDMS officials, one of linking the hospitals involved, and the third of using packet to report "casualties" to the Red Cross. Traffic: N3FM 406, N3EMD 375, NO3M 207, W3OKN 155, W3NGO 120, N3AES 109, WA3UNX 108, WA2QXA 66, WA3DBW 61, KC3YE 46, W3RUL 41, N3GLK 29, W3KUN 24, K3SMB 19, KF3V 13, WA3HJC 9, N3HID 8, KA3EGE 6, W3SN 5, KC4ITD 2, (July) WA2QXA 40.

CENTRAL DIVISION

ILLINOIS: SM, Dave Carlson, AA9D—SEC: W9QBH. BM: K9EUI. ACC: WB9SFT. STM: K9CNP. SGL: K9IDQ. TC: N9RF. OOC: W9TT. PIO: W9EWA. DEC: W9EBQ.

NET	FREQ	TIME (Local Illinois)
ISN	3905	1800 DAILY
ILN	3690	1830, 2200 DAILY
ITN	3705	1900 DAILY
CTN	147 69/09	2100 DAILY
ILARES	3905	1630 1ST, 3RD SUNDAYS
ILLINOIS INDEPENDENT NETS		
IEN	3940	0900 SUNDAYS
ILPN	3855	1645 M-F; 0830 SUNDAY
NCNP	3915	0700 M-SAT
NCNP	7270	1215 M-SAT

25 members of the Northwest Cook ARES participated in the annual Harvestfest in Hanover Park. They had a satellite station set up as well as a computer program running that illustrated the workings of satellite communications. They used the call sign KD9HP. A "Well Done" goes out to 26 hams who assisted with the rescue drill in Alton. New Madison County EC KD9SG was quoted in a newspaper article in the Alton County Journal describing the activity. WA9DIP, WD9HBB, N9DIX, N9FXE, and NM9J assisted the Boilingbrook Police during the Pathways Parade on Sunday, August 27. The following operators handled safety communications for the late summer equestrian field trails in Winfield/Whetson: N9IHL, WB9MRL, N9FWU, WB9YIN, KD9RU, N9IHL, K9DKN, N9IHL, N9IVG, N9BTF, N9FWU, N9IGA, N9KNC, N9GWU, K0ZTI, KD9XP, WD9GIG, KC9UM, and W9LRG. Traffic: KA9FEZ 546, W9HOT 132, W9HBI 118, WA9VLC 110, K9CNP 96, K9QEW 87, WD9HQW 76, N9SF 72, W9LWH 60, NC9T 56, WB9TD 52, KA9CTW/T 43, KA9JNE 40, WD9CIR 33, KA9TVU/T 27, WA9AXL 20, WA9SLT 12, N3AIA 11, N9HUW 9, WA9RUM 7, W9VEY/JM 7, K9EHP 4, KA9UEX 2, @N3AIA-BBS 18, (JULY) @N3AIA-BBS 17, N3AIA 6.

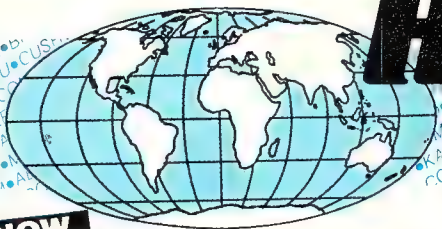
INDIANA: SM, Bruce Woodward, W9UMH—SEC: WD9AVQ. STM: WA9OHX. ACC: K9ZBM. TC: WA9JWL. SGL: WA9VQO. BM: W9OCL. PIO: N9IPA. OOC: K9JG. SM: WB9AHJ. Net Managers: ITN: KA9EIV, AUN: K9J, ICN: KD9ER. VHF: W9PMT, IWN: KA9ERC. AUGUST Net Reports:

NET	FREQ	TIME	DAILY UTC	QNI	QTC	QTR	SESS
ITN	3910	1330/2130/2300		2843	447	2043	91
QIN	3656	1430/0000/0300		378	152	807	60
ICN	3705	0100		25	3	145	12
IWN	3910	1310		1404		376	31
IWN VHF BLOOMINGTON				745		310	31
IWN VHF KOKOMO				972		216	31
IWN VHF LIGONIER				781		308	31
HOOSIER VHF NETS (20)				4598	119	3880	257
D9RN for AUGUST 380 QTC 62 ses. IN 95% by WA9OHK, W9UEM, K9ZLS, K9GCS, K9GBR, N9DWU, CAN 756 QTC in 31 ses. D9RN 100% by NR9K, K9ZLS, N9DWU, SILENT KEY: Paul Russell, N9CZP of Warsaw, IN. APPOINTMENTS: Packet Manager Ted Winkel, WB9AHJ, EC Lake County, Richard L. Terptrak, K9EMM Lowell, In, PIA, Daniel M. Shua-leck, WB9YRT, Dyer, In, Activity for the month is consistent with a large number of reports. The exception is the Indiana Code Net with only 12 sessions reported during the month. The ICN net time has changed to 8 PM (0100Z) please help. EC REPORTS: N9DUZ, W9DX, K9ET, N9ENC, WA9DOL, KA9VNC, KD9HB, W9KGE, W9JU, KD9ZN, N9DTG, WA9OQT, WA9HEE, WB9NCE, KC9CU, W9SIO, W9CFI, N9ADS, N9GSS, K9BACX, WB9UNL, N9FQA, N9DFU, KA9ZOR, KB9AVS, KA9KQ, W9EPT, WB9RVN, PACKET BBS REPORTS: W9ZRX 6498, WB9SYK 1694, N5AAA 1478, WA9UXP 1362, KA9LQM 1356, KD9QB 1210, N9BAC 587. PUBLIC SERVICE REPORTS: Hamilton County, WJ9U Triathlon/Allen County, N9ADS Three Rivers Festival Biond and Display Lake County, N9DTG March of Dimes 4x4 Mud Bog, Hammond, East Chicago, Gary triathlon, LaGrange County, WD9X Amish Land and Lakes Bike Tour, Bartholomew County, W9SIO, Honeysuckle 100 Bike Ride, 146.10/70 monitor program N9FOZ reports 276 hours with 2 fires, 2 road info, 9 accidents, 5 stalled cars, 4 weather nets, 1 power lines, 4 traffic lights, 2 road construction. Traffic: NR9K 270, WA9OHX 175, K9J 156, W9UEM 147, W9UMH 103, W9CNE 93, N9BS 74, W9OCL 68, WD9JAA 66, K9ZLS 54, KA9QME 43, N9DWU 39, KE9PR 39, KA9LQM 38, WA9QCF 37, NX9I 35, K9GBR 34, WB9QPA 31, W9PPO 30, K9FEI 28, N9FOZ 28, K9DBY 28, N9HZ 26, K9SBB 22, WB9IHR 18, WD9X 18, WD9HII 18, K9BHH 16, KD9DU 11, W9PMT 10, N9DIY 9, N9DTG 9, WD9DWD 8, K9OUP 8, W9RTH 7, WA9JNC 7, K9ZBM 6, WB9QZ 6, W9DQIV 5, W9OZJ 5, K9BGX 5, K9KTB 5, W9KMY 4, N29S 3, W9XZ 3, WB9AJY 3, WB9AHJ 3, W9K2 2, W9B7Z 2, KA9ZOD 2, KB9SU 1, W9CFI 1, WA6OIZ 1, AB9A 1, WA9HEE 1.							

WISCONSIN: SM, Richard R. Regent, K9GDR—SEC: W9ZAG. STM: K9CJ. ACC: KA9FOZ. BM: WB9JWS. OOC: NC9G. PIO: K9ZZ. TC: K9GDF. Congratulations to the Green

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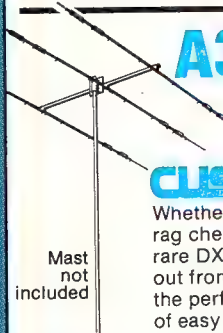


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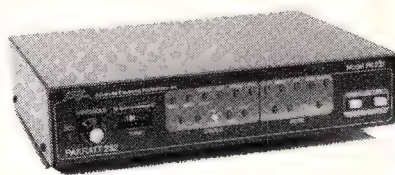
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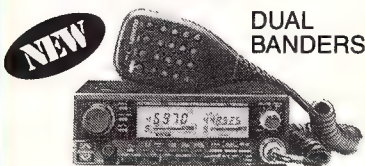
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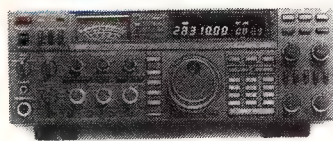
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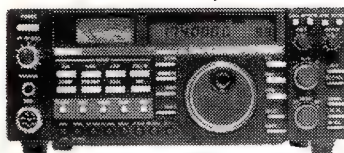
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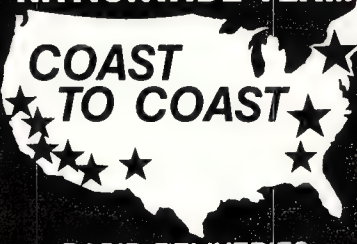
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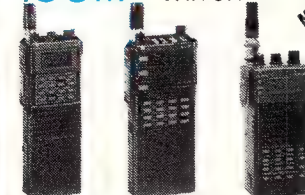
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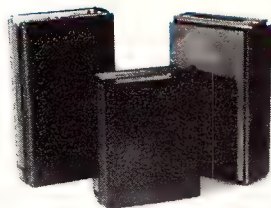
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Bay Mike & Key Club for 50 years of affiliation with the ARRL. Free map showing the revised District Emergency Coordinator boundaries for Wisconsin is available from our Section Emergency Coordinator, W9ZAG. New Emergency Coordinators are: Portage County, KA9ACE; Vilas County, KA9YQH; and Walworth County, KA9JJK. Monroe County EC, KA9PSL, is new Secretary of the Associated Public-Safety Communication Officers and will have Spring Regional Conference in La Crosse on May 8, 1990. Ozaukee Radio Club says new repeater is working fine on 224.18 MHz, give it a try. The Central Wisconsin RA has new WB9QFW/R Hustler G-7 repeater antenna. Watertown ARC has net on 145.49 Thursdays at 8:00 P.M. KJ9I described his DX-peditions and N9HC demonstrated his briefcase emergency packet system at Four Lakes ARC meetings. The 1989-90 \$500 scholarship winners of the West Allis ARC are KA9LWN of Shawano and WB9VOZ of Wausau. At the Wisconsin Nets Association Annual Picnic, members presented the 1988 traffic handling plaque to Hale Blakely, W9CBE with 2,939 points; endorsements tags for their previously awarded plaques were given to WB9PY (21,444 points) and KC9CJ (6,560 points). November 1st, Racine exams RAC exams Wauwatosa at East High School, send post card indicating tests needed to W9JK to register. November 4th, the Milwaukee Repeater Club will hold the 6.91 Friendly Fest open at 8:00 A.M., 7:00 A.M. for sellers, inside Serb Hall, 51st and Oklahoma in Milwaukee with free parking, contact K9LZV for more information. See you at the friendly ARRL table. The Friendly Fest will have on-site exams given by the Milwaukee RAC VEC starting at 9:00 A.M. November 4th, Racine exams at Red Cross Building, register with N9DMP. Dunn County ARC exams November 11th, Credit Union Office Building, Menomonie, info from WF9I. The West Allis RAC will hold its Awards Dinner soon. November 25th, Tomahawk VE exams 8:30 A.M., appointment with WA9W. Remember to indicate your Club participation when submitting an entry in the November phone or CW ARRL Sweepstakes, mark your log accordingly. Don't delay your antenna work any longer, winter is coming. Happy Thanksgiving to all. Traffic: WB9PY 2247, KC9CJ 1006, W9GJ 576, WA9W 365, W9YCV 278, W9CBE 264, W9KLN 233, N9BDL 159, K9GDF 148, W9IEM 114, W9UCL 112, W9CXY 110, KA9BHL 80, AD9X 76, K9AKG 73, KA9FVX 64, W9NGP 56, AG9G 54, N9HWB 52, KA9KLZ 44, N9BCX 39, W9BIC 39, K9EP 38, NS9Q 36, K9FHI 35, K9JPS 32, K9GB 31, W9ODV 24, K9UTQ 24, W9UW 9, W9PVD 2. (JULY) N9IKD 14.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KC0T—In spite of the glowing reports from Mel, N0FOO, in Brainerd, summer is slipping fast. But I do believe that conditions on the lower bands have been somewhat better for traffic nets. So, that's encouraging. Congratulations to Max, N0FKU of Bloomington as The Amateur Of The Month for August. Nice going Max, and thanks to all for your help and participation in MSN activities. I would like to get input from all of you each month for any information or ideas to help me with the write-up of this column. So, keep those cards and letters (and Messages) coming! The Minnesota Amateur Weather Net has resumed their operation for the season and that's good news - 6 PM daily immediately following MSP/NE. Traffic for the month totalled 1,697 with 21 stations reporting - thanks gang! Until next time, 73 es GL, Jim Swisher, KA0EPY, STM MN.

NET	FREQ	TIME	QNI/QTC/SESS	NET MGR
MSN/1	3685	6:30P	276/81/31	KA0EPY
MSN/2	3685	10:00P	273/59/30	KD0NH
MSN	3710	6:00P	354/29/31**	KA0SBY
MSP/N	3860	12:05P	292/12/29	—
MSP/NE	3860	5:30P	688/166/31	KC0T
PAW	3929	9:00A	275/240/119	W00BAC

**MSN additionally sent 42 training messages. Alt. Freq. MSN/1 and MSN/2-7070: MSP/N-7232. Traffic: WA0TFC 347, KA0EPY 303, W0GRW 212, N0FOO 160, K9I 141, N0RS 80, KA0SBY 70, N0FG 66, KA0ARP 62, KC0T 44, KD0NH 43, W0GUF 41, K0QBE 33, N0JP 27, W0RIQ 25, N0KCM 9, K0GI 9, W0KYG 9, K0WPK 6, KD0CI 5, N0GN 5.

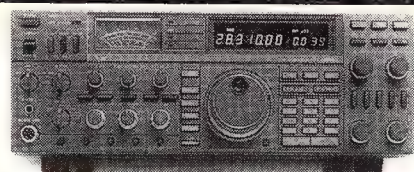
NORTH DAKOTA: SM, Bill Kurtti, WC0M—Grand Forks Hamfest Oct 14. Our search for the 1st Licensed Ham in ND is drawing to a close with these results. The 1st license was issued in 1914 to the University of ND in Grand Forks with the call 9YN, also in 1914 the following licenses were issued. 9GN to Charles Curtis, Pembina ND. - 9EN Ralph Fisher, Fargo, ND. - 9EM Andrew Love, Fargo, ND. - 9BQ Eddie Nelson, Fargo, ND. - 9FS Earl Reineke, Fargo, ND. In 1920 there were 16 licensed stations. 9AFP Richard Black, 9AFJ Vincent Carroll, 9GT James Corum, 9ABU V.M. Cousins, 9AI Paul Farseth, 9AHC Harold Demmer, 9AAO Carl Furburner, 9ADB Raymond Gilbert, 9EE Herbert Goddard, 9WU E.S. Leavenworth, 9AAM Reynold Moon, 9VJ Palmer Nelson, 9AGN Reul Sande, 9ZX R.H. Pray, 9LW Myron Weis, 9AEJ Bertrum Wick. If you have further info on these hams please let me know if you need the address of the last 16 I will send it to you. Traffic: KA0FSM 73.

NET	FREQ	TIME	SESS/QNI/QTC	MGR
Goose River	1990	9AM SU	4/49/0	NT0V
DATA	3941 kHz	6:30 DA	27/428/9	N0JUR
WX NETS	3941	Resume in Oct		W0GFE
Winter only		9AM-12:30PM	Mon-Fri	
STORM NET	3941 kHz	DURING STORMS ONLY		WC0M

SOUTH DAKOTA: SM, R.L. Cory W0YME Asst Sm N0ABE WA0FPR SEC KA0XPY STM KD0YL The South Dakota Centennial Wagon Train has completed its run of 1764 miles and was a great success. Many hams enjoyed their operating experience on the train and totaled over three thousand contacts. Two new repeater antennas have been installed on the Crandall Repeater on a 250 ft tower near Conde. NY0X KC0LI and W0YMB went to Glad Valley and made repairs on the Digi antenna so we expect to have Packet activity going strong again. WB0MJY has put the states first UHF repeater on the air at Watertown. Its input is 444.65 and its output is 449.65 WA0BZD has replaced the Sissone repeater with a new one still operating on 146.28/88 South Dakota Novice net 7PM CST every Sunday on 3725 MHz. with summer over ham activity will now pick up.

DELTA DIVISION

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—ASM: KB5CX. SEC: N5ADF. ACC: K5KR. SGL: KD5SL. TC: W5RWF. OOC: WB4ICV. Packet: WB5ASD. STM: WB4FDI.



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FL-63A 250 Hz CW filter (1st IF).... 59.00
FL-52A 500 Hz CW filter (2nd IF).... 115.00 109⁹⁵
FL-53A 250 Hz CW filter (2nd IF).... 115.00 109⁹⁵
FL-33 AM filter..... 49.00
FL-70 2.8 kHz wide SSB filter..... 59.00
RC-10 External frequency controller 49.00

IC-735 HF transceiver/SW rcvt/mic... 1149.00 999⁹⁵
PS-55 External power supply..... 219.00 199⁹⁵
AT-150 Auto. antenna tuner (Special) 445.00 369⁹⁵
FL-32A 500 Hz CW filter..... 69.00
EX-243 Electronic keyer unit..... 64.50
UT-30 Tone encoder..... 18.50



IC-725 Ultra compact HF xcvt/SW rcvt 949.00 829⁹⁵

Other Accessories Regular **SALE**
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IC-4KL HF 1KW out s/s amp w/ps.... 6995.00 5999
EX-627 HF auto. ant. selector (Special) 315.00 269⁹⁵
PS-15 20A external power supply..... 175.00 159⁹⁵
PS-30 Systems p/s w/cord, 6-pin plug 349.00 319⁹⁵
MB Mobile mount, 735/751A/761A.... 25.99
SP-3 External speaker..... 65.00
SP-7 Small external speaker..... 51.99
CR-64 High stab. ref. xtal for 751A.... 79.00
PP-1 Speaker/patch..... 179.00 164⁹⁵
SM-6 Desk microphone..... 47.95
SM-8 Desk mic - two cables, Scan.... 89.00
SM-10 Compressor/graph EQ, 8 pin mic 149.00 139⁹⁵
AT-100 100W 8-band auto. ant. tuner ... 445.00 389⁹⁵
AT-500 500W 9-band auto. ant. tuner ... 589.00 519⁹⁵
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IC-475A 25w 440 FM/SSB/CW w/ps 1399.00 1199
IC-475H 75w 440 FM/SSB/CW..... 1599.00 1369
IC-575A 25w 6/10m xcvt/ps (Special) 1399.00 1129
IC-575H 100w 6/10m xcvt..... 1699.00 1499

VHF/UHF/1.2 GHz Mobiles Regular **SALE**
IC-47A 25w 440 FM/TTP mic (Closeout) 549.00 369⁹⁵
PS-45 Compact 8A power supply.... 145.00 134⁹⁵
UT-16/EX-388 Voice synthesizer.... 34.99
SP-10 Slim-line external speaker.... 35.99

IC-28A 25w 2m FM, TTP mic (Special) 469.00 379⁹⁵
IC-28H 45w 2m FM, TTP mic..... 499.00 439⁹⁵

IC-48A 25w 440-450 FM, TTP mic.... 509.00 449⁹⁵
HM-14 Extra TTP microphone 59.00
UT-28 Digital code squelch 39.50
UT-29 Tone squelch decoder 46.00
HM-16 Speaker/microphone 34.00

IC-228A 25w 2m FM/TTP mic (Special) 509.00 429⁹⁵
IC-228H 45w 2m FM/TTP scan mic ... 539.00 479⁹⁵
IC-448A 25w 440 FM/TTP mic..... 509.00 449⁹⁵
UT-40 Pocket beep function 45.00
IC-900A Transceiver controller..... 639.00 569⁹⁵

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UX-19A 10m 10w band unit..... 299.00 269⁹⁵
UX-29A 2m 25w band unit..... 299.00 269⁹⁵
UX-29H 2m 45w band unit..... 349.00 319⁹⁵
UX-39A 220MHz 25W band unit..... 349.00 299⁹⁵
UX-59A 6m 10w unit..... 349.00 319⁹⁵
UX-129A 1.2GHz 10W band unit..... 549.00 499⁹⁵

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IC-1200A 10w, 1.2GHz FM (Closeout) 699.00 599⁹⁵
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IC-3210A 25w 2m/440 FM/TTP..... 739.00 649⁹⁵
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AH-32 2m/440 Dual Band antenna.... 39.00
AHB-32 Trunk-lip mount..... 35.00
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IC-2SAT 2m HT/TTP..... 439.00 389⁹⁵
IC-3SAT 220 HT/TTP 449.00 399⁹⁵
IC-4SAT 440 HT/TTP 449.00 399⁹⁵
IC-2GAT 2m HT/TTP 429.00 379⁹⁵
IC-4GAT 440MHz, TTP 449.00 399⁹⁵
IC-32AT 2m/440 HT 629.00 549⁹⁵

IC-12AT 1w 1.2GHz FM HT/TTP (Special) 473.00 349⁹⁵
IC-12GAT 1w 1.2GHz HT/batt/cgr/TTP 529.00 469⁹⁵

Aircraft band hand-helds Regular **SALE**
A-2 5W PEP synth. aircraft HT..... 525.00 479⁹⁵
A-20 Synth. aircraft HT w/VOR..... 625.00 569⁹⁵

Accessories for all except micros Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35 79.00
BP-8 800mah/8.4V Nicad Pak - use BC-35... 79.00
BC-35 Drop in desk charger for all batteries 79.00
BC-16U Wall charger for BP7/BP8..... 21.25
LC-11 Vinyl case for Dlx using BP-3 20.50
LC-14 Vinyl case for Dlx using BP-7/8 20.50
LC-02AT Leather case for Dlx models w/BP-7/8 54.50

Accessories for IC and IC-O series Regular
BP-2 425mah/7.2V Nicad Pak - use BC35.... 49.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak ... 39.50
BP-4 Alkaline battery case 16.00
BP-5 425mah/10.8V Nicad Pak - use BC35 65.00
CP-1 Cig. lighter plug/cord for BP3 or Dlx 13.65
CP-10 Battery separation cable w/clip..... 22.50
DC-1 DC operation pak for standard models 24.50
MB-16D Mobile mtg. bkt for all HTs..... 25.99
LC-2AT Leather case for standard models.... 54.50
HM-9 Speaker microphone..... 47.00
HS-10 Boom microphone/headset..... 24.50
HS-10SA Vox unit for HS-10 & Deluxe only 24.50
HS-10SB PTT unit for HS-10..... 24.50

For other HT Accessories not listed please **CALL**

Receivers Regular **SALE**
R-71A 100kHz to 30MHz receiver \$999.00 869⁹⁵
RC-11 Infrared remote controller 70.99
FL-32A 500 Hz CW filter..... 69.00
FL-63A 250 Hz CW filter (1st IF).... 59.00
FL-44A SSB filter (2nd IF)..... 178.00 159⁹⁵
EX-257 FM unit..... 49.00
EX-310 Voice synthesizer..... 59.00
CR-64 High stability oscillator xtal 79.00
SP-3 External speaker..... 65.00
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R-7000 25MHz-2GHz rcvt (Special)..... 1199.00 999⁹⁵
RC-12 Infrared remote controller 70.99
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ARRL Affiliated Clubs enjoy a number of perks. 51% ARRL membership is all that is required. Clubs remain in an active status by completing a short Annual Club Report Form. The following Louisiana Clubs have renewed for 1989. Ascension ARC, Catholic HS Baton Rouge ARC, Central La. ARC, Delta DX Assoc., First & Mouth Contest Company, Iberia ARC, Jefferson ARC, Livingston ARC, Louisiana Tech ARC, New Orleans VHF Club, Ozona ARC, Southeastern Univ. ARC, St. Mary AR Transmuting Soc. Thibodaux ARC, and West La. ARC. Nine ARRL Affiliated Clubs have not sent in their 1989 Report Forms. Has your group renewed this year? How about asking your secretary? It's not too late to renew or affiliate. Call or send a note for a Report Form or a new application folder. An Amateur Radio booth or display at a local shopping center is an ideal way to show your community the public service and emergency communications provided by amateur radio well as introducing them to a hobby with many different pursuits and unlimited horizons. Several clubs reported this last month how enjoyable and successful their weekend venture has been. How about your club? It's the old story. Put a little effort in and the personal reward will stay with you for a long time. 73 & good luck de "Wondy"—K5KR.

MISSISSIPPI: SM, Butch Magee, KF5DE—ASM: Mark Henry, WD5GHW, SEC: Bill Fryer, N5DVR. STM: Jim Leist, KB5W, SGL: Richard Redd, KA5WRX. I had the pleasure of speaking to the Rankin County ARC the last Tuesday in August. A good and ambitious organization who have a great interest in emergency service to the area and state. Many thanks to Allan Clark, WD5IKD for inviting me. By the time you read this the Biloxi Hamfest and State Convention will be over and done, so I'll say now I had a great time there because we always do and look forward to it each year. Jim Leist, KB5W, is the Section Traffic Manager and has written several articles on traffic handling and procedures in the Magnolia Report. We are going to have him hold one or two training sessions on the Mississippi Section Phone Net when he has a chance to get away from the National Nets one evening. Traffic into and out of the state has grown and we thank all the guys who handle all the traffic for us. You're doing a great job. The following report shows it. Thanks again.

NET	NET MANAGER	SESS	QNI	QTC
MSPN	W5OXA	31	2038	71
MTN	KB5W	31	209	93
MSN	W5YRX	22	117	10
GCSBN	W5JHS	31	1291	21
COAST ARES	N5LML	5	123	7 EMER.
MAGNOLIA	N5HBB	31	692	6
MERIDIAN	K5ASR	5	112	0
CAND	K5UPN	31	-	756
DRNS	W5YDD	62	-	701

Mississippi represented 100% by: K75Z, W5HKW, N55M, WB7CQQ, and KB5W. 73 from KF5DE.

TENNESSEE: SM, Harry Simpson, W4MI—Eastern Assistant SM and PIO: W4TYU. Central Assistant SM W4GLS, Western Assistant SM and ACC K4CXV. STM: NG4J. SEC: K4UVH. OOC: K4LSP. SGL: N4PQY. TC: W4HHK. The TN Phone Net is on 3980 kHz with early sessions at 6:40 AM Eastern, Regular sessions at 7:45 AM Eastern Monday thru Friday, at 9 AM Eastern on Saturdays, Sundays and Holidays. Evening sessions are Monday thru Saturday at 7:30 PM Eastern. CW Net Sessions are on 3635 kHz at 8 PM Eastern, Monday thru Friday. Silent Keys this month are Roy T. Hardin, W4GEC of Kingsport and Dalton Copeland, KB4RZD, of Memphis. It goes without saying that they will be missed by their many friends. The Delta Division Convention at Shreveport was excellent. It was held in the Civic Center, with excellent facilities including, would you believe, a pancake breakfast, complete with two sausages, syrup and coffee for \$2.50. I wonder if I can talk them into coming to Memphis. The ARRL forum was well-attended, including President Price, Delta Division Director Harrison, the Arkansas Section Manager and the Tennessee Section Manager. A variety of subjects was covered, with a lot of pros and cons, but nobody even mentioned the possible \$30 charge for renewing, modifying or issuing an amateur license! The following week, the Southeastern Division Convention was held in conjunction with the Huntsville, AL Hamfest. It was excellent. Everywhere you looked, there were Tennessee hams, which made it even more enjoyable. Finally, there was Lebanon, the most friendly hamfest in the state. It isn't commercial, but everyone you want to see is there, year after year, and I hope it continues forever. Hey, WB4LAL is doing a great job as CW Net Manager (as are all Net Managers). Would you believe we are having as many as eight operators check into the net in a single night? I remember when we wouldn't have eight in an entire week! Traffic: W4FMR 136, W4GZZ 62, W4MI 53, WB4LAL 28, W4PFP 27, W4TYV 27, K4WOP 25, K4SKDB 24, W4DDK 24, W4AHKU 10, K4CXY 8, W4PSN 4.

GREAT LAKES DIVISION

KENTUCKY: SM, John Thernes, WM4T—Asst. SM: KC4WN. SEC: WB4NHO. STM: K4MTX (August). Congratulations are in order for the KY Colonels ARC in Bowling Green for having obtained Special Service Club status. This is only the second club in Kentucky to receive this recognition. My thanks to B.A.R.S. of Lexington for another fine Georgetown Hamfest. The ARRL forum was packed and it was good to see so many appointees at the fest. If you are an appointee, please watch the expiration date of your ARRL membership. We would hate to lose you due to an oversight.

NET	QNI	QTC	SESS	MGR
MPKN	1368	117	31	WD4RWU
KTN	746	79	31	WD4RWU
KYN (BOTH)	298	117	62	K4AVX/KZBQ
TSMTN	412	40	31	KZBQ
KNTN	234	64	39	W4EBN

SAR (Aug): WD4RWU 172, KC4WN 74, K4VHF 67, W4AEBN 55, KB4UJA 55, K4AVX 36, K4QJH 32, N4LAF 20, W4AHLW 18, WB4AUN 16, K4MTX 13, N4PEK 11, W4TPB 11, W4ANOG 9, WD4CQF 7, KU4A-4. PSRR: K4QJH 99, KC4WN 81, K4MTX 60.

MICHIGAN: SM, George E. Race—WB8BGY (@N8FTY), ASM-WA1LRL (@WA1LRL), STM-WB8KQC (@N8TR), SGL-N8CNY, TC-W8YZ, OOC-WA2AJQ, ACC-N8JVA, PIO-N8KBA. Silent keys with deep regret: W8FXR, K8ZLB, N8EXX. —A MONUMENTAL TASK AHEAD FOR MICHIGAN AMATEURS— The 1991 ARRL Convention Planning Committee has announced plans for a monument, to be placed

at ARRL HQ, honoring US Amateurs who have given their lives participating in public service events. Proposed is a granite 8' ARRL Diamond mounted on a 4' granite base. Names, Calls, and other pertinent information will be carved into the monument. This gift from MI Amateurs, in commemoration of the first National ARRL Convention in MI, is going to need your financial support. Estimated total cost will be around \$20,000. Contributions can be sent to: Michigan Monument Fund, in care of Joe Turner, K8CQF. I am very pleased to announce the formation of the Northern MI Traffic Net. This VHF net will provide many new traffic outlets for Northern MI communities. The net is meeting daily on 147.12, the N8JCN repeater located near Gaylord. Proposed plans for linking to other Northern MI repeaters are in the planning as well. Net Manager is Dennis, N8JCL. Our STM, WD8KQC, has sanctioned this net as part of the MI National Traffic System. (Note Listing below) My thanks to retiring Jackson Co. EC, Dick, KA8VLN, for a job well done over the past 2 years. Welcome aboard to Scott Elliott, WD8IGK, new Jackson Co. EC. My thanks go to Tom, W8W, retiring MI Bulletin Manager. Good luck in your college studies. Is there anyone out there that would like to take on the job of Bulletin Manager? Please let me know if you are interested. The 1990 Michigan State ARRL Convention will be held in Gaylord. For further details contact Dennis, N8JCL. A very last minute notice! Don't forget to take part in the SET. Be sure to get your final reports to your DEC by Nov. 6th. How quickly we seem to come to the end of a year. I hope everyone has a very nice Thanksgiving holiday. 73, WB8BGY Please support the following MI area Nets:

NET	FREQ	TIME/DAY	QNI	QSP	SESS	MGR
MTN	3953	7:00PM Dy	568	200	30	WD8EIB
QMN*	3663	6:00PM Dy	471	121	62	WB8R
SEMTN	145.33	10:15PM Dy	416	113	31	N8HSC
MNN*	3722	5:30PM Dy	215	95	61	KA8BY
MACS*	3953	11:00AM M-Sa	344	73	31	K8OCP
UPN*	3921	5:00PM Dy	941	71	35	WA8DHB
GLETN	3932	9:00PM Dy	1076	58	31	NW8M
WSSBN	3935	7:00PM Dy	520	43	31	W8NDI
NMTN	147.12	7:30PM Dy				

NEW NTS MI VHF NET! N8JCL VHF Net Activity NO REPORT NOBQ *QMN Fast-6:30PM Dy, QMN Late-10PM Dy; MNN Late-8:00PM Dy; MACS-1PM Sun; UPN-12PM Sun. Traffic for August: KA8CPS-477, KF8AU-286, N8JS-169, WD8KQC-142, N8JAT/BBS-117, N8FTY/BBS-90, WB8SYA-88, WB8YPG-77, K8GCV-68, NW8M-61, N8FPN-57, N8IIC-56, WA8DHB-52, K3UWO-52, N8YH-51, N8HFC-46, K8CQF-45, W7LVB-44, W8EOI-43, K8ZJU-43, N8HHH-40, K6HAP-39, N8CNY-37, WD8EIB-37, WB8BYG-34, W8RNO-33, W8IHX-30, W8IHX-30, WB8YDZ-30, WD8MJB-30, K8OCP-29, K8UPE-28, K8IQ-24, N8IQS-20, W8J-18, K8BKY-16, N2IYA-16, W8MVBH-10, WD8AXB-8, W8VIZ-7, WT8J-7, W8BEZ-6, N6CRV-6, WB8WJV-5, N8EXS-4, N8FTY-4, KN8JDN-4, N8GGO-3, W8URM-1. July: NW8M-45.

OHIO: SM, John Haungs, WA8STX Ph: (513) 563-7373—ASM: David Kersten, N8AUJ, Ph: (216) 221-6740. SEC: WD8MPV. STM: KF8J. ACC: K3JO. ACT.BM: W8PH. TC: KB8MU. OOC: WB8ZCE. SGL: N8CVK. PIO: K8QOE.

NET	QNI	QTC	Sess	TIME(local)	FREQ	MGR
BN(E)	211	98	31	1845 DY	3.577	WD8C
BN(L)	214	100	31	2200 DY	3.577	K8TVG
BNR	192	81	31	1800 DY	3.605	W8EK
OSSBN	1699	825	92	1030,1615,18453	3.9725	N8BS
OSSN	186	100	31	0645 M-F	3.777	KD8HB
OSSN	—	—	—	0800 S-SU	3.577	KD8HB
OSN	231	70	28	1810 DY	3.708	WD8KBW
O6MN	—	—	—	2100 M-W-F	50.16	WD8CTC

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BNR-JUL 188 68 31 - 3.605 W8EK

During August, the main Section activities evolved around ham gatherings, hamfests, parades, and charitable events to raise money. The question has come up as to whether a donation from a non-profit organization for the Amateur Radio services provided is acceptable? If the Amateur Radio services are not advertised for a fee, there is no pecuniary interest. If an organization feels the services provided are of value to the success of the event and care to make a contribution to the operation of Amateur Radio group, there doesn't seem to be any conflict of interest, as long as the record shows the transaction as a donation. Congratulations to the long-time Amateur Radio Pioneers of the Columbus ARA who were present at the September meeting. They are entitled to a salute for their years of service. Please note that appointment endorsement stickers are no longer issued. Your Field Organization appointment is valid as long as you maintain appropriate activity, report as required, and keep your ARRL membership current. If your appointment certificate is lost or shabby and covered up with endorsements, contact your SM for a nice new one. The club newsletter editors in Ohio do a lot to keep our clubs strong and growing, and it takes a true devotion to keep the monthly schedule. Please help your editor by having your articles in on time. If you would like to volunteer some of your free time to help out in your particular County with the local RACES or ARES group and don't know who to contact, call your SM or ASM. The Greater Cincinnati ARA interesting program on Amateur Radio and the Law by John Weiss, WB8KLO, who is an ARRL Legal Representative ad also a former recipient of GARA scholarship funds. An ARRL Legal Representative will give an Amateur free initial contact service on an Amateur Radio related legal problem. Write ARRL for a contact in your area. Congratulations to those who have upgraded: Toledo ARC members: Pat Tandam, W8ST; Bob Wells, KB8GYT; Cheryl Hampshire, W8H; and Alan Bossler, Gen. Certif. IARC-MASHER MEMBERS: Jim Pierce, N8HTC; David Freeman, KA8EEN; Fred Freeman, N8KVU; Wesley Lloyd, KA8ETB, Mark Yannittall, KB8PEJ; Jim Norfleet, KB8HQM, Robert Freeman, Jr. and Aaron Howell II. Traffic: K8TVG 328, KD8HB 297, W8PMJ, KD8KU 264, WB8O 218, KA1S 175, K8JDI 173, WA8S1 165, K8ECV 165, WD8IKC 161, N8IIP 127, WA8STX 122, KF8J 121, N8FWA 111, W8JUL 109, K8ATW/B8 102, W8QZK 98, WD8RAQ 94, WB8DPZ 92, WD8BKN 68, K8CNM 78, WB8KWC 69, WB8VNV 69, W8SKP 66, W8RG 65, WB8JGW 64, KA8HBN 64, WB8FSV 63, WD8KBW 62, KA8CGF 62, W8LDU 61, K8LHD 55, W8EK 54, KA8YIT 54, N8EX 52, K8ALV 51, K8DXZ 51, WA8HED 50, KA8SON 50, WA8EYQ 40, N8SC

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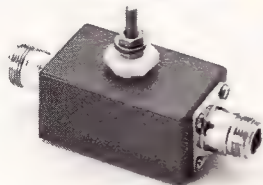
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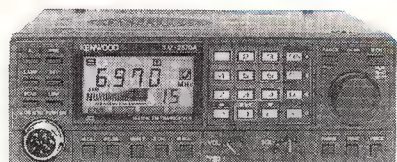
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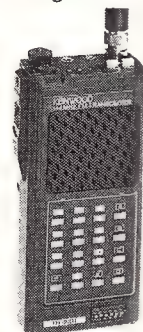
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MA-40	40'	21'6"	2	242	3" sq.	4 1/2"	\$ 809.00
MA-550	55'	22'1"	3	435	3" sq.	6"	\$1369.00
MA-550MDP*	55'	22'1"	3	620	3" sq.	6"	\$2909.00
MA-770	71'	22'10"	4	645	3" sq.	8"	\$2509.00
MA-770MDP*	71'	22'10"	4	830	3" sq.	8"	\$3969.00
MA-850MDP*	85'	23'6"	5	1128	3" sq.	10"	\$5349.00

*MDP models complete with heavy-duty motor drive with positive pull down.

FREE STANDING CRANK-UP TOWERS

Will handle 18 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TX-438	38'	21'6"	2	355	12 1/2"	15"	\$1019.00
TX-455	55'	22'	3	670	12 1/2"	18"	\$1539.00
TX-472	72'	22'8"	4	1040	12 1/2"	21 1/2"	\$2529.00
TX-472MDP*	72'	22'8"	4	1210	12 1/2"	21 1/2"	\$4069.00
TX-489	89'	23'4"	5	1590	12 1/2"	25 1/2"	\$4399.00
TX-489MDPL*	89'	23'4"	5	1800	12 1/2"	25 1/2"	\$6599.00

*TX-472MDP includes heavy-duty motor drive with positive pull down. TX-489MDPL comes with heavy-duty motor drive with dual level wind and positive pull down. (Both motor drive models include limit switch brackets).

FREE STANDING HEAVY-DUTY CRANK-UP TOWERS.

Will handle 30 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
HDX-538	38'	21'6"	2	600	15"	18"	\$1319.00
HDX-555	55'	22'	3	870	15"	21 1/2"	\$2309.00
HDX-572	72'	22'8"	4	1420	15"	25 1/2"	\$3959.00
HDX-572MDPL*	72'	22'8"	4	1600	15"	25 1/2"	\$6049.00
HDX-589MDPL*	89'	23'8"	5	2440	15"	30 1/2"	\$7919.00

*Includes heavy-duty motor drives with dual level wind and positive pull down. HDX-572MDPL includes limit switch brackets only. HDX-589MDPL includes limit switches and limit switch brackets.

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Will handle 18 sq. ft. antennas at 50 MPH winds. (TMM-433HD handles 24 sq. ft.)

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD Top	SEC. OD Bot.	SUGGESTED HAM PRICE
TMM-433SS*	33'	11'4"	4	315	10"	18"	\$1089.00
TMM-433HD*	33'	11'4"	4	400	12 1/2"	20 1/2"	\$1319.00
TMM-541SS*	41'	12'	5	430	10"	20 1/2"	\$1429.00

*Hy-Gain and some Alliance rotors when installed inside tower will restrict retracted height by approx. 24". Most Kenpro models allow full retraction.

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38, K8IOW 37, W8B/BBS 35, KB8AKW 35, NW8E 34, W8VND 32, W8BHHZ 32, N8INP 30, KA8GJV 30, W8PBX 30, KB8ESU 25, N8EFB 25, N2NS 24, N8CJ 24, N8HJB 23, KA8BNQ 23, KB8ABO 21, W9FWM 21, K8CJV 20, KB8AX 20, K8EF 19, K8D1C 19, W8DRI 18, N8CQ 18, K8WQ 18, K8D1X 17, K8CKY 17, K8ES 15, N8X 15, N8GOB 13, N8KTU 12, K8WZK 11, W8GDQ 11, W8BDC 10, K8BUI 10, K8BFX 9, N8JYV 9, N8CW 8, N8AJU 8, W8LDQ 8, W8D1J 6, N8F8B 6, N8JRV 5, W8RLB 5, W8BDM 5, N8FPH 4, N8G1O 3, KA8RIX 3, N8JOC 3, K8JA 2, W8D1CSP 2, KA8AUG 2, W8FPA 2, N8JBL 1, W8XT 1, W8ANZE 1, KA8CQF 1, W8BOFR 1, KB8HBQ 1. (Jul) N8JSN 70, W8EK 62, K8JA 12, N8AJU 10, W8RLB 4.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydarenny, WB2VUK—ASM: K2ZM. STM: WB2EAG. SEC: WA2ZYM. BM: WB2IXR. SGL: KB2HQ. PIO: KB2TM. OOC: N2DVQ. ATC: WA2VGM. ACC: KV2A. ASM/PACKET: N2FTR. ASM/NW5LTR: WB2NHC. NET REPORTS FOR AUGUST (NY/NJ/PA): CDN 622/85 ESS 367/62 HVN 282/38 NYP 103/71 NYPON 393/313 NYSE 310/250 NYSL 320/248 NYSM 275/228 SDN 290/89. CLUB NEWS: Albany ARA had a presentation from Hudson Division Director WA2DHF at Sep. meeting. Their joint RPI/AARA VE session included upgrades KE2AL, N2JPF, WB3CUF, N2GAX, KB2EMV, KB2IDS, K2UYK, KB2EBE, KB2BSE, WB2UVR, KB2HWM. Congrats to all. The Altamont Fair in August involved 37 hams total. Communications Club of New Rochelle is looking towards running a Novice or General course. Mt. Beacon reports the results of elections: Pres-N2GWC VP-K2DPL Treas.-K2LYE Cor. Sec-N2JBK Rec. Sec-KD2TZ Eng Dir-N2FZC Dirs-@lge-KD2AK WA2WLN WA2LJM WA2RKN. Saratoga RACES had a very successful Hamfest on the 9th of Sept. The weather was perfect, seminars were interesting. WECA learned about 40 meter phased vertical antennas from W2KFB. The tri-county groups of Albany, Schenectady and Rensselaer assisted with a drill for the National Disaster Medical Service. Those assisting included WA3RKB, WB2ZCM, KA2VAR, KB2EPR, WB2PUH, KA2AXN, KA2NMP, K2AYM, N2JJJ, KA2DVM, K2BST, WA2BUH, KA2MCU, WB2BEJ, WA2GYV, KB2CS, WA2BM, KA2VAH, KA2QAV, WA2WNI. Hope everyone got involved in the SET. It is not too early to think of the holidays and the traffic that is generated at that time. Please pitch in and help. There are opportunities on local VHF nets in addition to the CW or SSB nets. Please get involved. Please send me copies of your reports as well as to WB2EAG. Aug. PSRR:N5MEA WE2G WB2VUK WB1BTJ Aug. Traffic: WB1BTJ 612, WB2VUK 271, N5MEA 236, WA2JBO 145, WB2EAG 107, KB2EPU 83, K2LYE 72, WB2IV 40, WD2K 37, W2CJO 27, N2FTR 21, KA2Q 18, WF2M 13, N2IQV 8.

NEW YORK CITY-LONG ISLAND: SM, Walter M. Wenzel, KA2RGI—ASM: N2GQR. ACC/PIO: KA2LCC. SEC: WA2JUL. STM: K2MT. OOC: NB2T. TC: W2QUV. BM: W2JUP. The following are traffic nets in and around the section that handle NLI:

NET	FREQ	TIME	DAY	MGR
BAVHF	145.350/R	2000	DLY	K2TWZ
NCVHF	146.745/R	1930	M-F	N2IMP
SCVHF	145.370/R	2000	S-F	KA2JMA
NYPON	3913 kHz	1700	DLY	KA2UBD
NYS/M	3677 kHz	1000	DLY	N2EIA
NYS/L	3677 kHz	2200	DLY	KU2N
NLT	28450 kHz	2100	WED	N2IMP
ESS*	3590 kHz	1800	DLY	W2WSS

*Independent Net, recognized by NTS, local times.

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N2MH - 4 Queens Village 145.010 New York City A1/Q - 4 Freeport 145.010 Nassau, W. Suffolk W2HPM - 4 Farmingville 144.970 Central Suffolk NR2L - 4 Water Mill 145.090 Eastern Suffolk WB2IBQ - 4 Massapequa 145.030 Backup for A1/Q - 4 VE LISTINGS: LIMARC - second Saturday of each month at 9:30 AM at Salten Hall, NY Institute of Technology, Old Westbury - contact Al Jones, W2ZDB 516-676-5790 SUFFOLK COUNTY VE TEAM - second Saturday of each month at 9:30 AM at the Suffolk County Community College, Islip Arts Bldg., Selden, NY - contact George Sintchek, WA2VNV 516-751-0894; GRUMMAN ARC - second Tues. of each month, at 5:00 PM at the Grumman Rec. Center, Bldg. 800, South Oyster Bay Road, Hicksville, NY - contact Howard Liebman, W2QUV 516-354-6861; GREAT SOUTH BAY ARC - fourth Sunday each month at 12 Noon at the Babylon Town Hall Office Annex, 281 Phelps Lane, North Babylon, NY - contact Walter Wenzel, KA2RGI 516-957-5726; MAARC - last Thursday each month at 6:00 except Dec., at the Robert Wagner JHS, Manhattan - contact Rubina Asti, KD2IZ 212-838-5995. If your group holds regularly scheduled license exam sessions and/or classes let me know so they can be added to this listing. Computer use in Disaster and Emergency Management Decision Making will be the subject of the November 15, 1989 Emergency Education Satellite Video Broadcast which is presented by FEMA. It sounds like it will be full of interesting information for those who are emergency communication minded. The results from the August NDMS National exercise are back and I want to pass on to all those that participated the thanks and appreciation for your efforts in bringing the Nassau - Suffolk Area of NDMS up on line. Last month a similar exercise was included into the SET and we are still evaluating that exercise. If you would like more information about ARES, RACES, NTS, NDMS, or any other facet of emergency communications within the NYC/LI area please contact me. We are still looking for an individual (or two) that lives in Manhattan to act as a liaison between the National Weather Service at Rockefeller Plaza and the Amateur Radio Services for the NYC Metropolitan area which includes Long Island, Northern New Jersey and Westchester.

NORTHERN NEW JERSEY: SM, Rich Mesonen, NW2L—(@KD6TH) - ASMs: KA2F/Recruitment, W2VY/Youth, NW2S/NW, KY2S/SE, KC2ZA/SW. ACC: WA2QYX. BM: K2ULR. OO/AAC: KA2BZS. PIO: NW2L. SEC: WB2HBZ. SGL: W2KB. STM: K2VX. TC: KA9Q. HAM RADIO INFO LINE: 201-680-1585. This column exists for your benefit. As such, I'd like to tailor its contents to those items which are most important to the majority of readers. Please help by responding to the following mini-survey: Rank the categories of information below according to the priority they should receive for inclusion in the column (1 = most important to 10 = least important). I'll use the results to guide my writing. (My list is alphabetical): A. Club News (Programs, New Officers, etc.)

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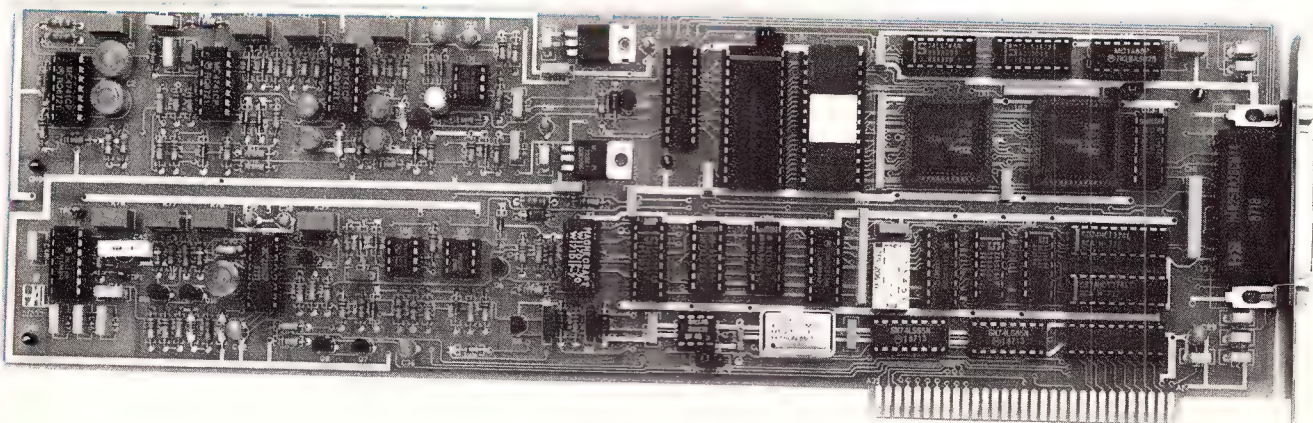
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// B. Field Organization News (Programs, Appointments, etc.)
// C. General News/Announcements // D. Leadership Official
Activities (Club visits, etc.) // E. Leadership Official Listings
(see top of column) // F. Names/Calls of new licensees/
upgrades // G. Net Listings (Times, Frequencies, etc.) // H.
Net Statistics (Sessions, no. of check-ins, no. of messages
passed) // I. Traffic Statistics (Individual listings: see below)
// J. Other (specify) // Please send me your responses (A-1,
B-2, etc., will be fine) by mail, NTS or by packet. I'll report
the results in a future column. Tnx. // Club news: SEC
WB2HBZ and SM NW2L spoke at Cherryville in August; RATS
heard from Div. Director WA2DHF, Bulletin Mgr. K2ULR, plus
W2VY and KD6TH, who introduced new PBBS software. In
September, WA2DHF, spoke at Sourland Mt. ARC and St.
Barnabas ARC. Enjoyed meeting lots of you at Sussex ARC
hamfest in July and Ramapo Mt. ARC fest in August. Welcome
to N2IXX, new NM of Hudson County Area Traffic & Emer-
gency Net (HCATEN), and good luck to outgoing NM N2HNK
in his new work assignment. I expect to have a new harmoni-
c (no. 2) by the time you read this, do don't be too upset if
I seem to take a while to reply to calls or letters. Next month:
report on Section Cabinet meeting. // August net activity (num-
bers are for sessions during month, of check-ins and of mes-
sages passed).

Net	Freq.	Time	Sess	QNI	QSP
NJM	3695	1000	31	234	92
NJNE	3695	1900	29	277	91
NJNL	3695	2200	31	135	36
NJPN	3950	1800	35	290	96
NJSN	3735	1830	31	147	29
NJVN/E	146.895	1930	31	539	84
NJVN/L	146.490	2230	31	176	50
OBTTN	147.120	2000	31	238	86
NJTTN	223.880	2100	31	201	26

Packet NTS 24 hr/day via WA2SNA-1 & other PBBSs Traffic
(Call/Messages Handled/PSHR total): W2QNL/383/134
K2VX/212/70 WB2FTX/177/64 N2XJ/129/98 W2RRX/88/84
KE2JX/73/59 N2DXP/62/60 KA2NE/55/73 KA2KJF/40/63
WA2PAC-T/26/57 W2CQC/22/- WA2EPI/18/- W2XD/15/- 73 de
NW2L.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, W0EJ-SEC: KD0BG. STM:
WB0AVW. ACC: NU0P. OOC: WA0QMU. BM: K0IR. TC:
K0DAS. SGL: WR0G. The Central Iowa Technical Society will
host the 20th Anniversary AMSAT Space Symposium and An-
nual Meeting in Des Moines on November 3 - 6. There will
be feature papers on current and major topics dealing with
amateur satellite activities as well as informal gatherings and
a banquet. More and more information is available document-
ing the excellent job done by local amateurs following the Uni-
ted Airlines Flight 232 crash in Sioux City on July 19. An
excellent article has been written by KA0VHV not only sum-
marizing this activity, but also thoroughly critiquing of this
major operation. This article is to appear in the November is-
sue of QST. The magnitude of this disaster taxed the
resources and excellent disaster planning of the Sioux City
area. The lessons learned by our Sioux City compatriots in
this disaster should be heeded by all of us. I am sure if you
contact KA0VHV he will be glad to share those experiences.
Over 60 amateurs from the Sioux City area are listed as as-
sisting in the recovery from this disaster. Their efforts were
largely ignored by the press outside Sioux City, but they
deserve our thanks and congratulations for a difficult job well
done! Traffic: W0SS 115, W0IPT 112, W0YLS 62, K0CNM 54,
KA0ADF 41, K0GP 40, W0MOCX 38, W0AVW 38, KA0VBA
26, N0JL 22, KE0WO 2.

KANSAS: SM, Robert M. Summers, K0BXF-SEC: N0BLD.
STM: W0YH. ACC: K0BXF. TC: KA0HEP. BM: K0JDD. SGL:
N0BLD. Net Mgrs: CW-W0MYM; WB0ZNY; Voice-W0FRC;
RTTY-open. Slow Speed CW. WX Net-W0YWZ. PIO:
WB0WSG. DECS: W0AOG, W0EB, W0YJT, W0FRC, NK0V,
WB0MDF, WB0CVR. Packet coordinator WA0ZBL. This has
not been a good month for a few on the sick list, K0JDD,
K0PFM and W0FDJ's sister Valeta. We also have the sad duty
to inform you of another Silent Key, K0LHF, Cliff Shaver of
Emporia. A word to the sick, get well—we miss you! Packet
coordinator WA0ZBL still needing to hear from all who are us-
ing packet radio, drop him a line. How about you RTTY guys
and gals out there, is there a coordinator among you?? Con-
tact your SM about the interest. Net activity for JULY 89 as
follows K0BN QNI 1279 QTC 154 & KPN 420/28 mgr W0FRC.
KMNW 620/496 and KWN 997/652 mgr W0YWZ. CSTN-1982/62
Mgr W0DE. QKS 170/57 Mgr W0ZYN. QKS-
SS 236/6 mgr W0MYM. Still missing a lot of club bulletins that
I am sure are being printed out there. Do your SM a favor and
check to be sure your club editor has me on his mailing list.
I need a DX reporter each month also. Any one wanting to
fill the slot?? What else would YOU like to see in this
column??? Traffic: KA0RCH 220, W0FIR 220, K0BXF 209,
N20M 193, W0FRC 135, N0B02 92, W0YH 87, W0FDJ 67,
W0QMT 64, WA0TJU 57, W0TE 26, KX0J 13, W0MYM 13,
WA0YXK 9, W0RBO 5.

MISSOURI: SM, Bill McGrannahan, K0ORB—August is al-
ways an exciting month for Ham Radio with two major ham-
fests and planning for the MS-150. The SW MO ARC hosted
the biggest and best OZARK REGIONAL HAMFEST ever with
outstanding seminars. The St. Charles Hamfest escaped be-
ing rained out and was great fun. ARRL Director Paul Grauer,
W0FIR and Vice director Chuck Miller, WA0KU, attended
both hamfests and conducted ARRL forums. Mike Bellinger,
K0UAA, was awarded the Robt. H. Lanyon award for Meritori-
ous Community Service by the Kansas City ARC. ARRL Cer-
tificates of Merit (MO Section) were awarded to Royce Brown,
WB0PO; Jeannie Hahn, KA0JWW; and David Hahn,
WB0UDM. All three are involved in many public service ac-
tivities in the St. Louis area. The NW St. Louis ARC sponsored
the 1989 QSO party on the 19th to the 21st. The Tri-Lakes and
the Kimberling City ARC's sponsored a big bash for the depart-
ing K0PUE and his XYL. ATTENTION ALL CLUBS: Denise
Hagerdon, AJ0E, is the new AFFILIATED CLUBS COORDI-
NATOR. Please put her on your mailing list. TYPOS: the STM
is ND0N and the BM is W0DLG. Vicki Gooch, KA0SDJ is SK.
My PBBS is K0ORB-1, V KCMO or WB0OIZ's BBS.

NAME	MGR	FREQ	TIME (cdt)	DAY	SES	QNI	QTC
MCRN	AI0G	3.585	7:0-45	D	62	239	135
MOSSB	WB0WLU	3.963	6:30	D	31	659	86
MEOW	WB0ELL	3.963	5:30	D	30	585	60
HBN	K0DSQ	3.880	12:05	M-F	23	408	28
KCARC	WA0TU	146.82	6:30	Th	4	107	14

HARC	KA0SX	146.94	9:00	Th	5	136	11
CMEN	K0PKC	146.76	9:00	W	5	84	11
PHD	WA0KU	146.43s	9:00	M	4	95	6
SWMSWN	K0KXC	146.91-	7:00	Tu	5	151	5
RBBN	W0NFI	146.79-	8:00	D	17	160	2
ZAEN	WB0ELL	147.24+	8:00	W	5	68	2
SLARES	K0WEX	146.91-	8:00	M	4	238	1
P.REVERE	WB0EJ				4	245	0
QCWA35	K0OIQ	146.97-	8:30	Th	4	67	0
JCRC	W0ORI	147.00-	8:00	W	5	66	0
SEDARES	W0ENW	147.03-	9:00	Tu	5	64	0
KCAES	K0UAA	146.97	9:00 AM	Sa	7	59	0
CARL	WB0WLU	146.46s	8:30	W	4	42	0
LOZBC	N0HVO	146.73-	6:30 AM	M-Sa			
LOZFM	N0HVO	146.73-	9:00				
MOPAC-1	WA0JFT	145.01s					
ARES	K0BACG	147.255+	9:00	Th			
ELDON	N0HIZ	146.895-	8:00	M	4	20	0

Traffic: WA0YJX 200, N0C0N 199, AI0B 164, WA0HTN 99,
KF0BM 49, W0QUD 49, WB0WLU 38, K0ORB 31, K0PCK 19,
W0RL 15, W0R0R 14, WB0UCI 14, KE0AH 3.

NEBRASKA: SM, Vern Wirka, WB0GQM—Sixty four amateur
radio operators assisted with emergency communications and
transportation of needed supplies following the July 19 crash
of United Airlines Flight 232 at the Sioux Gateway Airport in
Sioux City, IA. Dakota County, Nebraska, EC, Mike Nicolaus,
NF0N, and Woodbury County Iowa assistant EC, Doug Potts,
KA0VHV, directed the amateur operations which totaled 1150
hours over a five day period. Amateurs handled traffic for the
Sioux City Police and Fire Departments, Woodbury County
EOC. 185th Air National Guard, Sioux Gateway Airport, Red
Cross, Salvation Army, National Safety Transportation Board,
also hospital, ambulance services and medical personnel.
Amateurs provided communications between the temporary
morgue and the Iowa State Medical Examiner at the crash
site. Siouxland Amateur Radio operators also used their own
private vehicles for delivery of clothes for crash survivors as
well as food, beverages, water, and ice for several govern-
ment agencies. Of the 296 persons on board the DC-10 that
crashed, 185 survived and 111 died. Members of the Pioneer
Amateur Radio Club of Fremont and Dodge County ARS
sponsored a special events station during the annual "John
C. Fremont Days" in August. Steve Narans, WB0VNF, Dodge
County EC, reports 25 amateurs participated, making 40 con-
tacts and handling one piece of priority traffic which assisted
in locating some lost children. Leo Myerson, W0GFG, found-
er of "World Radio," has put together a collection of antique
and vintage Amateur Radio equipment for a display at the
"Western Heritage Museum" in Omaha. Traffic: K0DKM 278,
W0KVM 23, WB0GQM 20, KE0XQ 12, WA0BOK 7, W0EWH
7, W0BO 2.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Caesar Rondina, Another Oyster Fest
was here and gone. And what a fest. Amateur Radio has once
again played an important part in the message and traffic
handling portion of this festive event. But who are the people
behind the scenes. Well Hoyt, W1WP, has done a great job
of putting it all together. A job well done. Thanks also has to
go to Tim, NU1W, Betsey, K1EIC (STM), and luck, KY1T, for
there efforts in moving the traffic from the fest to the appropriate
nets. Also, a super job by the net managers of WESTCON,
NUTMEG, and CPN for holding the extra sessions to accom-
modate the large numbers of messages. And we must remem-
ber all the individual hams that receive and deliver these
messages. A grand thanks to all. As a reminder, KY1T is the
net manager of the CONNECTICUT SECTION TRAFFIC
NODE, which has been moved from KY1T BBS to my BBS,
N1DCS-4. Access to the BBS is now on 145.05, and 145.07.
Our section had 98.6% REP in 1RN cycle 3, and 100% REP
in FRN/2. Let's face it gang, our Traffic people got it together.
Great job. Bruce, N1FIQ from SCARA, sponsored a trip to the
Paul Newman camp for kids with cancer. The purpose was
to promote, introduce and demonstrate ham radio. Great for
ham radio and the kids. Nice job Bruce. The WHARA sup-
plied communications for the city of West Haven for the cities largest
parade in its history, sponsoring the National Convention for
fire chiefs. I've been told that their participation helped in
making the communications move right along. Nice job
WHARA. Congrats to Bob, WB1GYZ for his new role on the
staff of Key Klix, the Meriden ARC newsletter. ZYGO ARC
has worked all ZARC award. Nice to see clubs sponsor internal
awards. FARA also does the same, TNX to scrams for their
help in the E. Lyme marathon. Natchaug ARC handled COMM
for the cross country bike trek. We've been a busy section.
Thanks to all for a job well done. 73

WESCOON	31	499	89	KA1GWE
KY1F	1RN			
NVTN	31	591	231	NM1K
CN	62	310	189	W1WCG
TMRCN	4	50	1	NM1K

PBBS Reports
BBS Received Forwarded Total
Ct. Section Traffic Node N1DCS-4 BBS 474 402 876. KY1T
NM. Traffic: NM1K 516, W1WCG 215, W1EFW 206, KY1T
173, K1EIC 150, KA1GWE 143, KA1JAN 115, KY1F 87,
N1FNN 72, N1GBP 52, N1API 42, KB1ZC 41, KA1UCU 37,
W1WP 35, KC1OL 31, W1KYU 25, WA1YOL 25, KA1ROL 24,
N1GKJ 21, WB1ESJ 18, W1BDN 13, W1YOL 12, W1CUH 10,
N1BOW 9, W1QV 8

EASTERN MASSACHUSETTS: SM/SEC, Barry Porter,
KB1PA-STM: WA1TBY; ACC: N1GTB; BM: KA1NOI; OO/AA:
AG1F; SGL: K3H1; TC: KA1IU; PIO: K1HLZ EMass Hotline:
617-437-0111

Net	Freq	Time (EDT)	Day	Ses	QTC	QNI
EMRI	KA1GEP	3658	1900/2200	DY	30	159
EMRIPN	3880	1730	DY	30	47	105
EMRISS	3715	2100	DY	24	24	63
EM2MN	63/23	2000	DY	27	95	321
HHTN	04/64	2230	DY	31	117	329
CITN	745/045	1930	DY	31	88	510
NEEPN	3945	0830	SUN	4	9	

It's hard to believe that the summer is over and when this gets
printed we will be worrying about snow. There will be a few
emergency response drills this fall. One of the many functions
Hams play in the overall emergency planning is to provide an
outlet for Health and Welfare messages. In order to do this
Hams need to know a little about handling message traffic.
The above listed nets function to provide that training. If you
are unfamiliar with traffic net operation why not listen in?? If

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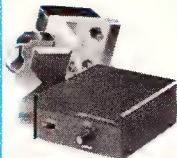
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TS-940S



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TEN-TEC



TH-75A

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OMNI V



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IC-2GAT
IC-4GAT



IC-725



IC-765



IC-228A

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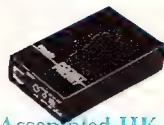
Kit SA-2060A

Pocket packet TNC

5W Dual Band
Handheld Transceiver
Assembled HWS-24-HT



Assembled HK-21



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Heathkit 1000W linear amplifier



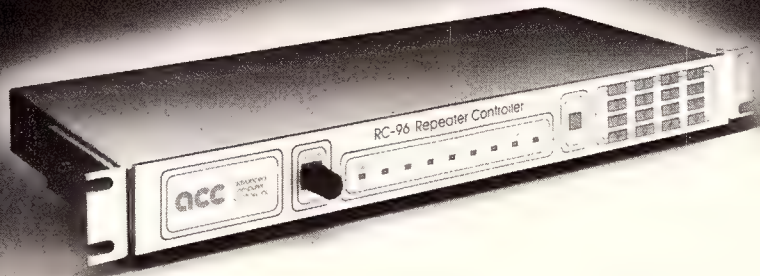
Heathkit deluxe QRP
CW transceiver

Kit HW-9



Kit SB-1000

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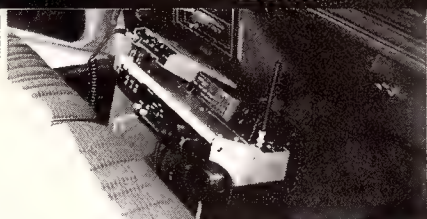
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YOU had to originate traffic in an emergency would you know what to do? An emergency is no time to learn. The area SKYWARN nets will be getting a revised training syllabus that should be ready for next spring. ACC N1GTB is planning to revive CEMARC, the coordinating club for clubs. Each club should have received info on this meeting by now. It is vital that someone from each club attend. WAITBY is looking for a few good hams to check into the afternoon HF traffic nets. If you are around, contact Jim. This is also the flea market season. I will be at Deerfield, MIT and Framingham. Hope to see you there. The Boston Computer Society Ham Radio Special Interest Group is rolling right along. In December they will be the Host to Wayne Green. If anyone is interested in attending Wayne's talk, it will be on December 5th. The American Red Cross Club is also growing and has some interesting events planned. Welcome back to all the college students!! If any clubs are looking for speakers, The section cabinet is available. Contact N1GTB or myself if you are interested. If you are interested in satellites, but have not tried it yet, the launch of 6 "micro" Sats in November should be quite a motivation. If you are going to have classes this fall, please let N1GTB know so she can keep a data base to refer potential hams to a nearby class. Have you done anything to enhance ham radio's reputation this month?? Please express your opinion on Amateur Radio issues to your section or division staff. We appreciate your input. Traffic Totals: KA1PEP 30, KA1NOI 8, N1AJJ 25, AA1GEP 103, KA1RCY 55, KA1AMR 12, KA1MDM 24, N1FWV 16, K1ABO 34, K1UGM 824, W1CE 91, K1GGS 107, N1FLO 89, W1BTY 379, KA1DJV 24, WA1FNM 99, KB1EB 2, KB1AF 219, K1SEC 6, K1UEB 9, WA1CRE 18, KA1EDY 10, N1CVC 131, N1FWV 16, W1TC 107, K1BZD 18, KW1U 353, KA1KCU 1.

MAINE: SM, Ted Bonesteel, WA2ERT—The Maine Public Service Net meets 0900 Sundays 3940 kHz. It's now a full Section Net handling traffic, discussions, training, and possibly drills. The fourth Sunday will be the Maine On-the-Air ARRL Cabinet meeting. All of you are encouraged to participate in all sessions. There is now a monthly ARES Newsletter being sent to DEC/EC's, section officials, and club secretaries. All clubs are asked to publish the contents in your newsletters to provide maximum dissemination throughout Maine. The Pen Bay ARC provided comms for the New Hope for Women Bike Trek Aug 26/27. N1AKP and N1EXD participated at RR tank car acid spill in S. Portland on Jul 15. Station Act: W1KX 197, KA1REB 74, WA2ERT 73, W1JTH 70, NR1F 51, ND1A 39, K1UNQ 38, KA1ODT 32, W1VEH 31, W1BWX 23, WA1YNZ 20, KA2ZKM/1 11, N1BCF 10, and W1OTQ 5. Nets (Sess/QNI/OTC/Mgr): Pine Tree/31/31/18/W1KX; Sea Gull/27/830/107/K1GUP; Kennebec ARES/5/66/1/KA1LPW; Central Maine Emergency/9/21/31/16/N1D2; Cumberland ARES/4/49/1/KA1ODT; Aroostook Emergency 15/108/9/W1YNZ. Register with your County Emergency Coordinator, get involved with ARES/RACES, and participate in the Section and local nets. Remember, Public Service is a major part of Amateur Radio.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE- PIO:WA2MBQ, SEC:K1ACL. Summer is behind us and Amateur activities are on the upswing around the section. GBRA announced a new net started by some of the new licensees on the 10M band. According to NCS, KA1CUC indicates that the net is designed to help new hams get familiar with procedures and terminology and to help with technical problems. They are also working on getting some CW training going. The net meets each night at 8 PM (local) on 28.405. The Lakes Region RA scribe W1LIM reports that the club had a great cookout at Hugh's camp with 35 people attending. Apparently, none of the hotdogs or hamburgers survived the event! A note to all who worked on the Tour de Sol solar car race this year—the race planning efforts for 1990 have begun and we have been asked to participate in planning the route and to address safety concerns. They are planning on 30-40 cars next year, so it will be a much bigger event! If you are interested in working on the planning phase of this project, drop me a note. More summer fun—CVRC members and family enjoyed a family fun day at the QTH of NR1N. And Dale KW1I gave his award winning AM slide presentation to the club August meeting. IRS Pres WB1HBB reported that their annual "breakfast" outing was a lot of fun with lots of eggs, bacon, muffins and coffee disappearing in the process! And the IRS is resuming monthly fox hunts. Here is a good activity to involve new hams. They get experience in antenna building, DF techniques and mobile operations. Welcome to the new Ascutney Repeater Assoc officer: Pres-Cal W1JFP, Sec/ Treas- Carl N1CB. Twin State RC will be moving its meeting location as the Montshire Museum in Hanover is relocating to new quarters. For more information, contact club pres KA1CRP. And congratulations to Charles Wallace W1IIB and the T-9 club on their 50th year as an ARRL affiliated club! NARC board member WA1UXA reports on a cooperative project at the Nashua Red Cross which involved station installation, EMI reduction, and new antennas. Hams involved in the ongoing project include NARC board members WA1UXA, KA1ORQ, NO1V, Field organization OO KC3NG and Red Cross Disaster Chairman N1GSN. EC KA1GOZ says that NARC now has new status with local police and fire agencies in major HAZ-MAT situations. This will involve inter-agency communications via portable packet stations. Have you thought about helping us in the Field Organization in serving your fellow Hams? The FO provides a variety of services to the Amateur community in the areas of technical, operating, and club support. We have a wide range of appointments available and if you would like more information, contact me via telcon, mail or packet via KB4N. On the traffic front, the new VTNH combined net is rolling along with 225 check-ins in 31 sessions in August. W1ALE and W1PEX had the highest check-in rates for the month. The NH section had 100% representation on FRN/2 and 1RN/3. Thanks to the ops who expended the time and effort to make this happen! August 1989 NH NTS Summary: Nets: VTNH 288, GSPN 138, GFSM 87. Traffic: W1PEX 2329, KB4N 1347, N1CPX 415, W1FYR 286, K1TQY 196, KA1ROH 67, W1ALE 54, KK1E 51, N1ALM 32, KA1HPO 11, WA1YZN NU1A KA1SXM 6, KA1GOZ 3, NE1J KA1LMR 2, KA1KFX 1. BPL: W1PEX, KB4N. PSNR: N1CPX, W1PEX, W1ALE, KA1HPO.

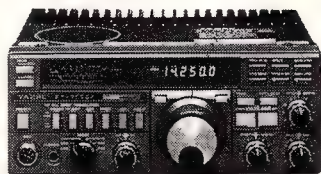
RHODE ISLAND: SM, William Foss, KA1JXH—NRIRC provided communications for the big apartment fire in Cranston on Aug 26th. 6 ops from the NCRG furnished communications for the "Velo" Bike Race on Aug 13th, thru Middletown and Portsmouth. 74 bikers in a 10.3 miles speed-timed race. On Aug 5th & 6th. OSARG provided communication for Shake-

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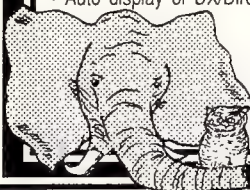
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tremendous effort from the Warm Lake fire. A story about the
fires with pictures has been sent to the ARRL, hopefully they
will publish it in QST. Again, TNXS to all who helped! 73s Don.
Traffic: KE7RT 563, W7GHT 364, W7NPO 262, N7MAL 226,
W7JMH 168, W7ASA 134, W57U 118, KA7WZM 88, KA7T 37.

Net	Seas	QNI	QTC	Mgr.
FARM	31	2065	175	WA7GSM
NW7N	31	733	20	WA7VAO
ID CD	23	709	14	K7UBC
IMN	31	278	190	KA7EEE

MONTANA: SM, Pete Peters, K7FR—ASM: WB7QDN,
WA7PZO. SEC: KS7R. STM: W77GU. OOC: W7DEO. ACC:
KC7A. SGL: KY7I. TC: K7YD. PIO: K7BFJ. BM: WA7TUW.
DCM: KE7TB. New digipeater east of Kalispell, K7LY7. 2
Silent Keys, N7CHV, Joe Gates, K7CZN. Al Johnson.
Congrats to Bob Lydiard on 50 year pin from QCWA Bob was
first licensed June 13, 1939. Novice: Bob Monrow, Leo
Skiora, Patrick Kujawa, Regina Wumsch. TC: KB7FWX,
KB7HVK, KB7HFN, KB7FPK, K7HPA, KB7HPK, KB7HPV,
KB7HRL, KB7HRD, KB7HSU, KB7HXB, KA7JMH and Bert
Richardson. Extra: N7NIN, K7T7M. Traffic: KA7YYR 123.

NET	SESS	QNI	QTC	NET MGR
MTN	31	1391	100	NTA1K
MSN	4	57	1	K7FR
IMN	31	278	190	KA7EEE

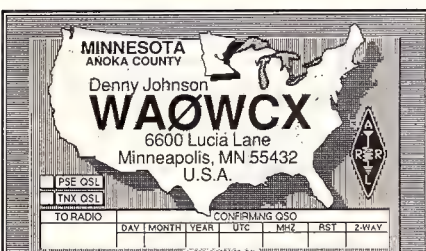
OREGON: SM, Randy Stinson, KZ7T—ASM: KM7R. ASM:
W7FBP. STM: W7VSE. SEC: KV7F. PIO: KC7YN. SGL:
KA7KSK. ACC: WF7Q. OO: WN7W. STC: N7ENI. Radio operators
of Khabarovsk in Russia, a sister city of Portland, have
invited radio operators of Portland to visit and participate in
the Radio Sport Games. Six area hams are going - Kevin Hunt,
WA7VTD, Dick Fredrickson, WA6DM, Rena Berlinger, KX7Z,
Larry Warner, K5SNA, Dave Wright, N7MYO and John White,
K7RUN who is taking his wife, Rose, and daughter, Elizabeth.
Randall Schaub, WA7AWJ will act as their QSL Manager. Our
hams have permission to give the Russians the U.S. VE test
and will issue special call signs. Lane County has been divided
into two EC jurisdictions - East and West Lane County. The
new Emergency Coordinator for the western section is George,
WA7SMZ. Shortly after his appointment, there was a tele-
phone outage and he had to activate his group. What a great
way to get started. Congratulations George and welcome to the
ARES group. Traffic (P) = Packet W7VSE 569, W7TA 549,
W7G7H 350, KA7EEE 312, WX7A 277, WB7VMS 246P,
N7BGW 234, W7LNE 73, N7DRP 58, W7ODG 39, KA7JAD
26, KA7DEF 14, KA7FWF 12, Late July WG7H 196, W7TA
154, W7FA 54.

EASTERN WASHINGTON: SM, Tom Plaisance, KC7PH—
STM: W7GB. SEC: WA7CBX. OOC: W7LKR. ASM: KC7MM.
ACC: NQ7M. SGL: KD7AC. TC: W7DBV. ASM: KE7WG. Who
in the section operates low power UHF? Contact the SM with
that info. Don't forget the SET, get involved with your local
ARES. Sorry to report SILENT KEYS WA7RSQ Mac McNelly
and N7FW Larry Shane from the Spokane area. Contact Jim
Follansbee, N7YT, for VEC testing in the Tri-Cities area. Ron
Smith, W7IGC, was presented a plaque in appreciation for
service to WARTS by W7GB and KC7PH, among others, at the
NW Division Convention. KB7P and WA7QAX-1 are two
personal bulletin boards in Moses Lake and Ephrata and can
be accessed thru RLD node on packet. Don't think the FCC
doesn't come around anymore. TC W7DBV reports that a
representative was in Spokane in late August. If your repeater
experiences unintentional interference, contact TC W7DBV.
If it is intentional, contact OO W7LKR. SEC WA7CBX reports
382 public service hrs. 73, KC7PH @ N7HHU BBS. Traffic:
W7GB 195, WA7YEN 22.

WESTERN WASHINGTON: SM, Ed Holloway, KA7INX
(@N7HFZ). STM: KD7ME (@K7KNZ). SEC: NM7N (N7HFZ).
OOC: (@W7LJ). SGL: KD7HC. BM N7CAK (@W7LJ). PIO
n7zfkv. ASM K7CCL. (@K7IFG). ACC: K7RL (@W7LJ). Con-
gratulations are in order for Mary Lewis, W7QGP who will take
over the position of Section Manager as of October 1, 1989.
My thanks to those of you who supported me in this election
and as your Section Manager for the past several months.
Twas quite an experience! Have you noticed the activity on
7050/7052 MHz lately? Quite a few have begun to operate
on the Mobile Side. Myself included. Try it, you'll like it!
Tacoma Hamfair here and over and quite a success. Brad,
K7RL, has resigned as ACC as has also Henry NK7E as DEC
Pierce/Thurston County. Thanks guys for a job well done.
Summer almost over and hope that all of your outside antenna
work is done as a good winter QSO'ing can be accomplished.
Radio Club of Tacoma manning a booth at the Puyallup Fair,
which promises to be a dandy. Again, thanks to all of you who
have helped me in the past with the work of SM. It's really
appreciated. Public Service: 56 hours. Skagit County 89,
Island County 19, King 292, Thurston 25, Cowlitz-Wahkiakum
131, Jefferson 12. Traffic: K7AJT 10, K7CLL 5, KA7CRN 22,
WB7EJS 2, N7GGJ 42, W7IGC 540 (BPL). W7LG 211,
KA7PMD 0, K7SUX 90, KA7T7Y 43, W7TVA 154, K7UQH 46,
WB7WOW 169, KR7F (July). PSNR: KD7ME 110, WB7WOW
107, W7TVA 85, 73, Ed, KA7INX.

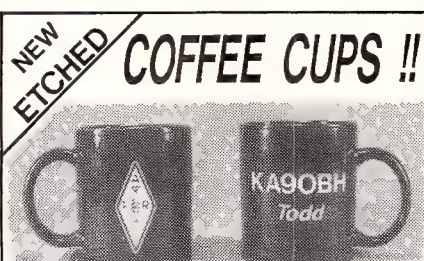
PACIFIC DIVISION

EAST BAY: SM, Bob Valle, W6RGG—ASMs: W6ZF,
WB3FCV. SEC: W6LKE. STM: K6APW. OOC: K6TI. TC:
N6AMG. Congrats to N6VMK/T for making the Public Service
Honors Roll two months running, and to WB6DOB and W6VOM
who qualify almost every month! The CCCC has reached 124
members with these new members: KA8HJV, N6VMK,
KC6DXK & WA1HFN. Their repeater fund was the beneficiary
of a raffle of fine household items donated by a local store.
The NBARA is planning their participation in this years SET.
"QRZ NBARA" editor, W6DJPA, has set aside page 2 of each
issue for the membership to express their opinions on any
subject. HRC may soon be running their Novice classes from
the Kaiser Hospital facility in Hayward, with both day and
evening classes being planned. MDARC's ATV repeater will
soon be running a 100W xmit on the 2.4 GHz downlink.
Member (and Section Emergency Coordinator) W6LKE
appeared on the program "The Informed Viewer" shown on
channel 64, where he was able to describe Amateur Radio's
role in emergency communications. The club also welcomed
new members N6VEF, W6AKOK, N6VHS & David Vega.
LARK members N6FEF and KM4MF presented a program on
the use of some of the latest keyers to make all CW opera-
tion, not just contests, more enjoyable. The latest recipient
of the J. K. Murphy Award is KC6DTB, and Klutz of the Month
honors went to NF6SI EBARC as their guest speaker Mr.



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The Ameritron AL-80A combines the economical 3-500Z with a heavy duty tank circuit to achieve nearly 70% efficiency from 160 to 15 meters. It has wide frequency coverage for MARS and other authorized services. Typical drive is 85 watts to give over 1000 watts PEP SSB and 850 watts CW RF output. A new Pi-L output circuit for 80 and 160 gives full band coverage and exceptionally smooth tuning.

Size: 15½"D. x 14"W. x 8"H. Wgt. 52 lbs.



AL-1200 LINEAR AMPLIFIER

3CX1200 TUBE

Full legal output with 100 watts drive.

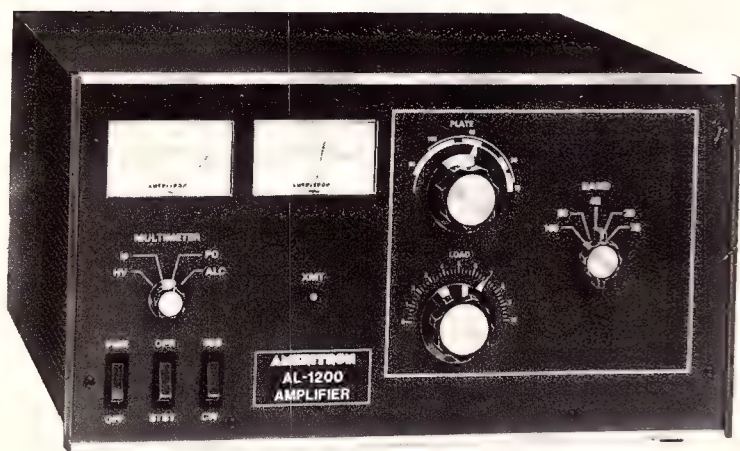
AL-1500 LINEAR AMPLIFIER

8877 TUBE

Full legal output with 65 watts drive.

The cooling system in both amplifiers keeps the tube safely below the manufacturers ratings even when operating at 1500 watts output with a steady carrier. The filament supply has inrush current limiting to insure maximum tube life.

Size: 18½"D. x 17"W. x 10"H. Wgt. 77 lbs.



AL-84 LINEAR AMPLIFIER

ATR-15 TUNER

The Ameritron ATR-15 is a 1500 watt "T" network tuner that covers 1.8 through 30 MHz in 10 dedicated bands. Handles full legal power on all amateur bands above 1.8 MHz.

Five outputs are selected from a heavy duty antenna switch allowing the rapid choice of three coaxial lines, one single terminal feed or a balanced output. An internal balun provides 1:1 or 4:1 ratios (user selectable) on the balanced output terminals.

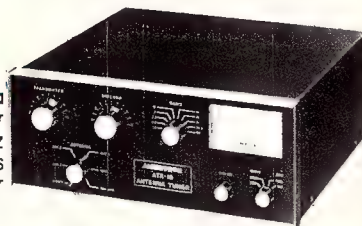
A peak reading wattmeter and SWR bridge is standard in the ATR-15. It accurately reads envelope powers up to 2KW.

Size: 6"H. x 13¼"W. x 16"D. Wgt. 14 lbs.



The Ameritron AL-84 is an economical amplifier using four 6MJ6 tubes to develop 400 watts output on CW and 600 watts PEP on SSB from 160 through 15 meters. Drive required is 70 w typical, 100 w max. The passive input network presents a low SWR input to the exciter. Power input is 900 watts. The AL-84 is an excellent back-up, portable or beginner's amplifier.

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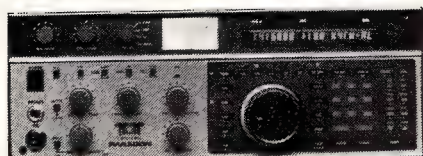
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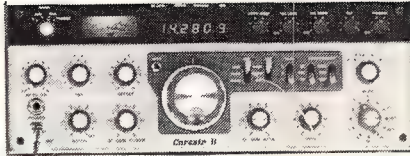
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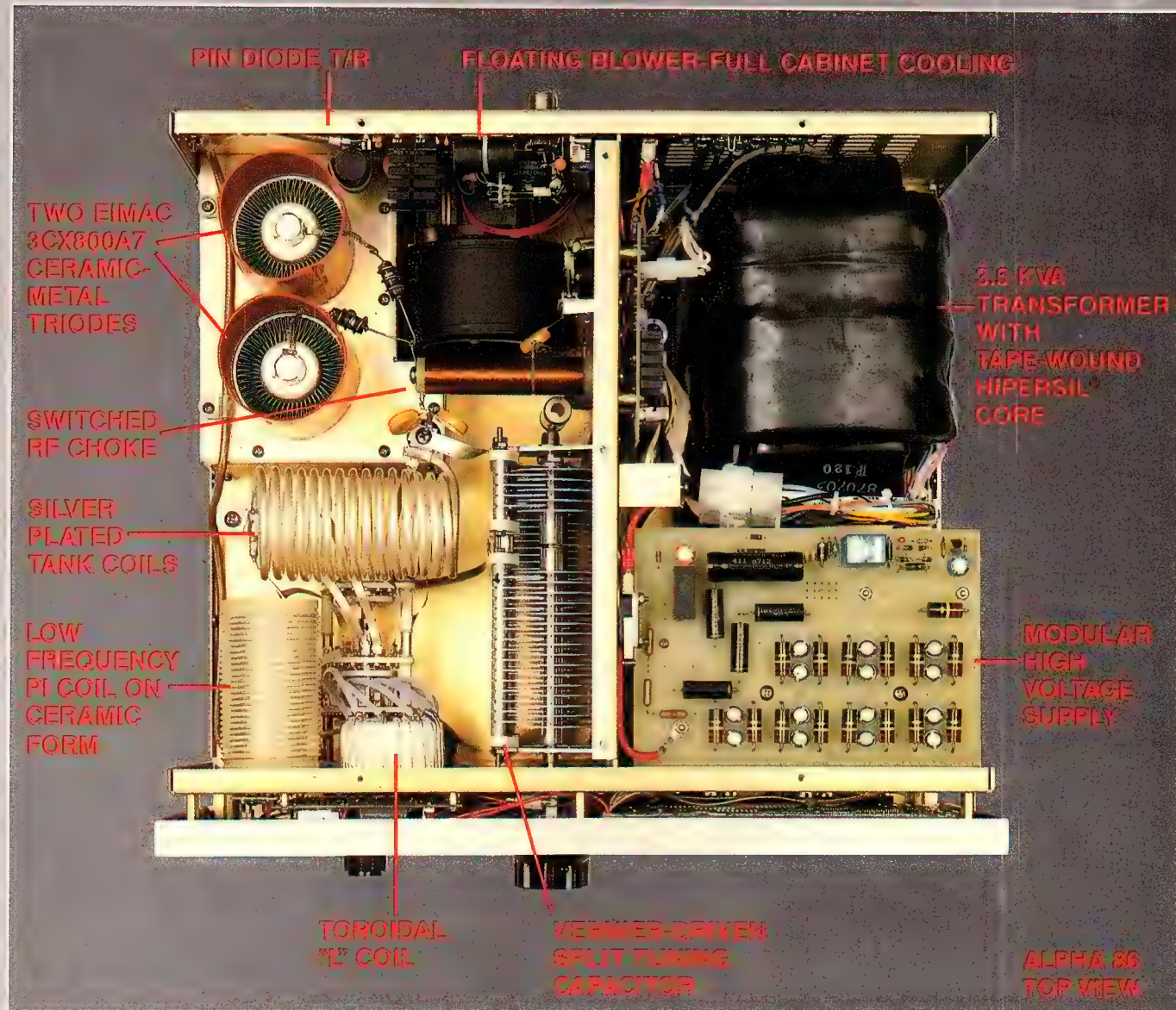
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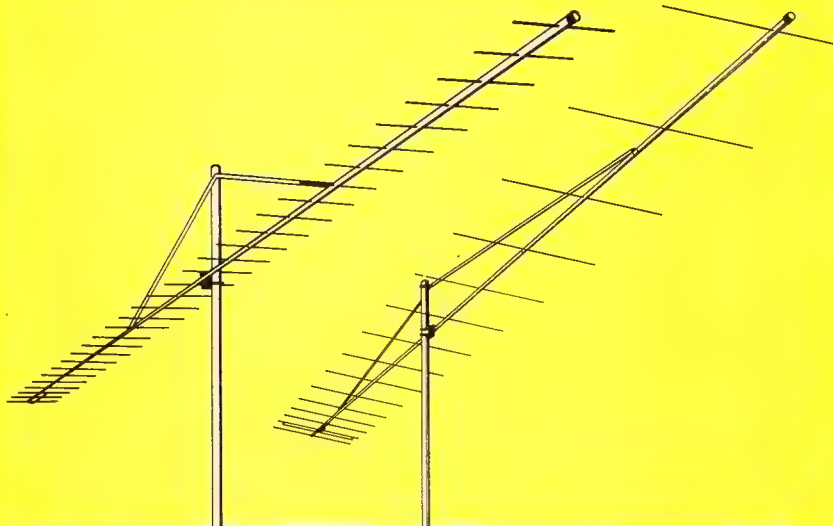
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Mechanical	7031-DX	215-DX
Number of Elements	31	15
Element Diameter	3/16 in. (4.8 mm)	3/16 in. (4.8 mm)
Element Lengths	10 1/2-13 7/8 in. (267-352 mm)	34 9/16-39 3/4 in. (878-1010 mm)
Boom Diameter	1-1/4 in. (25-32 mm)	1-1/4 in. (25-32 mm)
Boom Length	288 3/4 in. (24.06 ft.) (7.33 m)	33 3/4 in. (27.88 ft.) (8.5 m)
Turning Radius (max)	12' 7" (3.8 m)	14' 1 1/2" (4.3 m)
Wind Area	1.9 sq. ft. (0.18 sq. m)	2.75 sq. ft. (.256 sq. m)
Wind Survival	90 mph (155 km/hr)	90 mph (155 km/hr)
Weight (net)	9.25 lbs. (4.2 kg)	13.56 lbs. (6.15 kg)
Boom Support	7/8, 5/8 in. tubular (22, 16 mm)	7/8, 5/8 in. tubular (22, 16 mm)
Mast Size Accepted	1 1/2-2 1/8 in. (38-52 mm)	1 1/2-2 1/8 in. (38-52 mm)
Polarization	Horizontal	Horizontal
Electrical		
Gain		
Beamwidth		
Front/Back		
Sidelobe Levels		
Typical VSWR	1.2:1	1.2:1
Maximum Power	1 kW ave. 2 kW pep	1 kW ave. 2 kW pep
Freq. Range (useable)	420-438 MHz	144.0-146.0 MHz
Elec. Boom Length	10.42 wavelengths	4.03 wavelengths
Connector	Type N - female	Type N - female

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S. Marti-Volkoff of the San Francisco office of the FCC. Aug ttc: WB6DOB/212, W6VOM/146, N6VMK/44, WB6UZX/43.

NEVADA: SM, Joe Lambert, W8IXD. ASM: Carly Silva, K7HRW. KF6GB has been appointed as Assistant RACES officer for Clark County. N7KLO is the new EC for Douglas County. QCWA Net in Southern Nevada is on the 145.39 repeater at 8 p.m., Monday evenings. KF7GB again conducting novice classes in LV. seems like all the clubs are fixing up their repeaters in preparation for the winter weather. SNARS has been providing communications for more races than I can count! If you can help, contact K7HRW. TARA has made magnetic car signs for ready identification at public service functions. other clubs may want to try this. I hope that by now everyone is sending traffic reports to KK4M. traffic counts for August: NOIA-79, KK4M-46, KF7GB-6, N7JMG-6, KK4M-qualified for the Public Service Honor Roll with 69 points.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—This is my next-to-last report to you and time to list and thank the Section Staff. Some have been with me the entire four years that I have been SM but most have joined more recently. Jettie Hill, W6RFF, who has been filling the Affiliated Club Coordinator and Technical Coordinator spots is your new SM and is asking as many as possible to stay on. I particularly want to thank Jack La Flesh, KF6KJ, Northern Counties Asst. SM and Marj, N6JTT, Asst SM for staff recruiting who got many of the present appointees to join or recruited the Senior Staff members who did fill out his staff. Notably those are former SEC Deane Coats, NR6A, and present OOC John Canaris, WY6O. They built great Emergency and Official Observer staffs respectively. The Section Traffic Manager deserves special mention; Al Beigler, WA6WJZ, has been doing a great job since he was appointed by one of my predecessors. In addition to managing the Section traffic, he has made the traffic report to QST each month. Also part of the Senior staff are Jim Pratt, N6IG as SGL, Mark Nelson, AA6DX, and Bob McClard, WA6OWH, as PIOs and Ron Murdock, WB5FIX, as BM. Although not part of the Bulletin Manager's regular duties, he has been copying ARRL bulletins and putting them on packet for most of the western US. The rest of the staff will be covered in my final report next month. Traffic: WA6WJZ 160, N6QAF 93, WA6ZUD 42, W6CFQ 32, W6RFF 27, N6DOJ 26, K6SRF 13, WB6SRQ 10, K86WJ 2.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: N6JQJ. TC:WA6PWW. STM: N6JLJ. PIO:N6HMO. ACC: W6MKM. BM:(vacant). OOC: KA6S. AUGUST - Gee, here we are in those lazy crazy daze of summer. The CDF/IP group in Santa Clara county had an exercise, and what an exercise (I'm still puffing from climbing up that hill)...The saga of the Foothill Electronics Museum continues. A number of clubs, including EMARC and FARS have met here for many years. While the potential for its conversion into something other than a museum still exists, current scuttlebutt suggests that things are not as dark as they once seemed...speaking of Foothill, the last Foothill Electronics Flea Market was a rousing success. There were so many potential sellers that there was no space for late comers! As always, a fine time was had by all... The Los Gatos/Monte Sereno ARES newsletter continues to be an excellent newsletter. Their front page story is the Los Gatos EC's (KJ6CW) description of how last months earthquake went for him and his family. He describes the 3AM shaker as "...room was simulating a boat in a violent ocean." Jim lives nearby at the epicenter and so received a very through shaking! The August T-hunt had a rather unglorious ending when the "bunny" (WA6PWW & xyl KG6UI) were rousted out of their excellent hiding place by some non-Ham people. Too bad, it was an excellent challenge. Kit & Deb will be the bunny again in September. The monthly T-hunt occurs on the third Saturday of each month at 7:30PM local. The hunters meet at Cristo Rey Drive in Los Altos and procede to hunt for the 2 meter bunny (a VERY large rabbit indeed!)... The Naval Post-graduate School ARC in Monterey continues to be one of the most active groups in the section. They meet on the second Thursday of each month, have a breakfast on the first Saturday of each month, and seem to have even more nets and other activities than the more heavily populated Bay area!...The Stanford Linear Accelerator ARC is in the process of putting up a 6 meter repeater... There is a telephone number that has information on Amateur radio License classes, (408) 971-1424. Well... it only has the info that I put on it, and I can only put on it what I know about. PLEASE, let me know about any classes your group or club is sponsoring so that I may include them on the recording. My phone number is on page 8 of this issue of QST. Phone numbers: Amateur Radio Classes (408) 971-1424. License Exams (408) 984-8353 (ARRL VEC) or (408) 255-9000 (Sunnyvale VEC)

ROANOKE DIVISION

NORTH CAROLINA: SM, W. Reed Whitten, AB4W—ASM: AB4S. SEC: N4MYB. STM: K4NLK. BM: K4IWW. ACC: WC4T. TC: KM4OX. SGL: KE4ML. PIO: AB4FW. Congratulations and thanks to Tom KM4LB who did a superb job organizing Amateur Radio Public Awareness activities in Wake County, held on Sep 16. Tom recruited participation from Raleigh ARS and Cary ARC. Diane WB4INM was responsible for the RARS display in one shopping mall. Cary ARC set up an elaborate display of old and new Amateur Radio equipment in another mall. Jan N4UTT & Bill KB7LX were among the many Hams who provided major assistance. Hopefully there were other Public Awareness efforts in NC. Please let me know about similar activities so they can be reported in this column. [BT] Start final plans for a CHRISTMAS TRAFFIC BOOTH. Shopping malls usually welcome this type activity since we are providing a free service. The goal should be public awareness, not traffic count. Signs explaining our public service activities, schedules of Novice classes and local club meetings, and "free radiograms" should be displayed. Equipment displays and operating CW receivers are quite effective in attracting interest. Potential hams, inactive hams, and just interested observers are the audience. [BT] Hurricane threat from "Hugo" provided a good public relations opportunity for Amateur Radio. TV, radio, and newspapers featured many local operators monitoring traffic from Puerto Rico. On Sep 19 Tom KM4LB, Bruce K4ME (Area B DEC) and AB4W (your SM) were featured on a two hour "talk show" about Amateur Radio on WPTF (a 50 kW regional AM). ARES, SKYWARN, HAM WATCH, licensing procedures, Novice classes, radio clubs and hurricane preparation activities were discussed. (We were given three hours notice to appear on this program.)

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Huge pileups, big city QRN, no spare parts, and a long way to anywhere. You probably couldn't find a better test of the new SB-1400 All-Mode Transceiver than Heath's expedition to Taipei in the Republic of China.

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ICOM's Tips for Great HF Mobiling

Our present era of high sunspot activity and outstanding signal propagation is once again inspiring widespread interest in HF mobiling, and with good reason. DX'ing on the open road is great, mountaintopping is terrific, and operating 6 meters or the WARC bands from your auto adds an exciting new twist to the action. HF mobile setups are also good traveling companions on lengthy trips, and they are an ideal alternative for amateurs living in antenna-restricting apartments or condos. Installing an HF setup in today's semi-plastic and "bumperless" autos is also a cinch when ICOM is on your side.

The basic steps to going HF mobile are installing a dependable and high performance transceiver in your auto and complimenting it with an automatic multiband antenna system. Think safety and convenience during installation, and you will be on the right track. Mount your transceiver in a location that is easy to reach and permits good air circulation for cooling. Use your ingenuity to determine that "ideal spot." Most autos have at least one. Since a 100 watt transceiver draws up to 20 amperes of current while transmitting, its DC power cable should be connected directly to your auto's battery. A plastic hole plug or unused firewall opening can usually be replaced or fitted with a rubber grommet for routing that cable.

Since a mobile setup is fully self-contained and uses a short vertical antenna, a low resistance metal ground system is vital for maximum efficiency with minimum RF feedback and good noise reduction. ICOM's helpful hints for proper and effective grounding are electrically connecting both the transceiver's rear ground terminal and the antenna's ground/coax shield directly to your auto's steel frame. Flexible copper braid removed from an unused length of coax makes good grounding strap. Remember to clean all body connection points before installation for low resistance. Adding an extra piece of that strap between the auto's frame and rear tailpipe also reduces ignition noise quite significantly. Your completed ground system should be checked with an ohmmeter after installation. Unplug the antenna's coax

connector from your transceiver, connect one ohmmeter lead to its shell and the other lead to your transceiver's ground strap. You can then measure conductivity through the coax and your ground connections, on through the auto's body, and back to your rig. A total resistance of less than 5 ohms assures grounding and an impressive on-the-air signal.

A smooth operating transceiver of proven reliability and outstanding circuit design is a mobileer's greatest asset. **ICOM's new IC-726, go-anywhere IC-725 and deluxe IC-735 are rated tops in those categories by thousands of radio amateurs worldwide.** Each transceiver works 160 through 10 meters with 100 watts output, full shortwave reception, 105db dynamic range, rugged power amplifier sections, and a fantastic array of advanced operating features detailed in ICOM ads.

In addition to working all HF bands and modes, ICOM's new IC-726 also operates the fascinating 6 meter band with 10 watts output on CW, SSB and FM modes. Separate rear panel coax connectors are employed for HF and 6 meters to make band and antenna changing easy. As numerous amateurs heartily agree, 6 meters is a super band during years of high sunspot activity. Long distance openings happen almost daily, operators are friendly and congenial, and you can work the world with only a few watts of power and a small antenna. Six is terrific.

ICOM's extremely popular IC-725 is very similar to the IC-726 except it does not include 6 meter operation or reception of the 46.2 to 61.2 MHz range, and FM operation requires ICOM's optional UI-7 module. Both the IC-726 and IC-725 fit anywhere (3.7 x 9.0 x 9.4 inches H,W,D), and feature ultra-low noise Direct Digital Synthesized dual VFO's like the IC-781 (great for mobiling as they minimize "buckshot intermod" from ignition noises). They also incorporate band stacking registers that retain last-selected frequencies and modes on each band, a direct feed mixer with panel-selectable RF preamp and attenuator, plus a built-in controller for their optional AH-3 automatic multiband mobile antenna tuner.

The AH-3 installs in your auto's trunk and connects to its mating AH-2b mobile whip for

operating 80 through 10 meters. The AH-2b includes a hefty universal mount that bolts to an existing hole in your auto's frame and extends below the bumper area. Band switching and antenna tuning track automatically with your transceiver's operation for totally superb mobiling.

ICOM's deluxe featured IC-735 is a serious mobileer's dream rig. This all band and all mode HF transceiver sports passband tuning, audio speech compressor, and a DX record of phenomenal reliability. Seldom required controls are located behind a protective front access door for easy mobiling. The IC-735's optional AH-2/AH-2b automatic mobile antenna system also covers 80 through 10 meters in top style.

Adding the perfect finishing touch to your mobile setup is also a snap with ICOM accessories. The HS-15 mobile boom mic attaches near your auto's sunvisor, its matching HS-15SB P.T.T. box with up/down tuning buttons clamps to the gearshift lever, and you enjoy safe hands-free mobiling. Whether fixed, mobile or portable, ICOM transceivers and accessories are your key to outstanding performance and longterm enjoyment. They are also backed with the industry's best one year warranty. Ready to track in top style? Get rolling with ICOM and enjoy going first class all the way!

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Additional Options: SM-8 or SM-6 desk mic, PS-55 AC power supply, AT-150 automatic antenna tuner for base operation.

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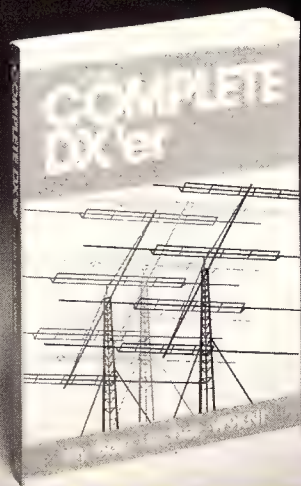
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THE AMERICAN RADIO RELAY LEAGUE
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News stories about Amateur Radio are becoming a standard item when a natural disaster threatens our area or a disaster elsewhere is a major story. Be prepared to respond to a request from a newspaper or broadcast station. Contact them and provide names and phone numbers of several knowledgeable local hams. [BT] Ninth Annual Greater Greensboro Hamfest is scheduled for November 25 & 26 [BT] August traffic: K4NLK 343, K14YV 199, N9CGD 162, K4IWW 157, WD4HTE 151, N4JL 127, K44EYF 127, K7BLX 120, K84FWL 74, AA4ZV 72, WA9NEW 71, N4LST 53, WD4MRD 46, N4SVZ 43, K4VHU 41, WB4WJ 39, W4LWZ 39, N4SMS 35, N4JTG 34, WA4MNR 32, W4EHF 27, N4OIC 19, N4SHE 19, K4ANJ 17, W4EAT 17, K4YJB 16, AB4W 16, WD4LOO 15, N4UOE 15, N4MQU 14, N4UE 14, KC4GCK 13, K4AKGZ 11, W8KLF 10, W4EDN 10, WD4LSS 10, K4ABN 6

SOUTH CAROLINA: SM, Ned Moeller, N4FVU—BM: K5CVD. OOC: W4NTO. PIO: AB4ID. SEC: K8APP. STM: W4ANK. TC: W4AUNZ. Holiday Greetings to all of you! May the new year be as good to us as the past 12 months. I thank all of you for your support throughout my first year as SM. May we continue to grow. 145.01 MHz packet coverage has improved with W4PHY's digipeater station GRAVES and his PBBS in North Augusta. Two meter coverage of the Savannah River Emergency Net includes 10 SC counties. The net meets 8:00 PM daily on 145.49 (-600) MHz N4JA Augusta repeater for purposes of traffic handling, swap shop & rag chew. Special thanks to all Net Managers, Net Controls & Liaisons. Keep up the good work! I appreciate all the reports, especially the monthly OO, EC & Public Service Activity reports. I endeavor to keep everyone informed which includes ARRL Hqs. COMMUNICATION IS THE NAME OF THE GAME. August traffic: W4GYM 848, K14FL 570, W4ANK 120, N4MEJ 54, K4ALRM 40, W4DRF 32.

VIRGINIA: SM, Claude Feigley, W3ATQ—There has not been any change in the section's net schedule or managerial assignments. A complete listing is in last month's QST. It appears that the Amateur Radio facilities at the Boy Scout Jamboree were very successful from a traffic handling and demonstration point of view. WB0TAX who was heavily involved in the Packet operation reports he handled over 700 NTS messages and without exception the messages were dispatched very rapidly throughout the 40 and 20 meter Packet nets. He reports that the average sitting time for messages on his board was no longer than 2 or 3 hours. A fine example of the proficiency of Packet in clearing bulk traffic from the originating point. I understand approximately 2040 messages were passed from the Jamboree site via Packet. SEC, WB4ZTR sez N4SCK is a replacement for WB4WZZ as Fairfax county EC. The training & information sessions following the Monday VSBNet net instituted by our STM, N4GHI, have been well attended. This is your opportunity to improve your traffic handling procedures and to seek info on the section and ARRL activities. Thanks to the Albermarle and the Massanutten clubs for joining those clubs that are sending me copies of their newsletter, they are very informative and helpful in keeping me abreast of the section's club activity. A special commendation to WB4LNT who masterminded the communication arrangements so vital to the arrival and dispersal of the scouts at the Jamboree and to the Woodbridge Wireless members who were responsible for providing and putting into operation the amateur stations for use by the scouts. Some upcoming VE exam sessions: Nov. 4, Portsmouth ARC contact AA4AT—Nov. 4, Shenandoah Valley ARC contact NC4B—Richmond, Va. contact N4RPI—Nov. 11 contact KB4WOM—Nov. 18, Manassas contact W4PVA—Dec. 2, Va. Beach contact K4AUNC. A REMINDER—Nominations are being solicited for the office of Section Manager. Nomination forms can be obtained from League Headquarters or the SM, W3ATQ. As stated before it is not my intention or desire to seek reelection as Section Manager. It was good seeing and talking to many of you at the Va. Beach hamfest. It is still not too late to get your antennas and equipment ready for an active period of DXing and traffic handling. Traffic: WB0TAX 3072, N4GHI 523, K4DOR 434, AA4HO 432, WB4D 348, N4EXQ 324, W3ATQ 306, K4JVT 209, WB4PNY 196, WB4VMX 159, K4MTX 152, KB4OPR 113, W4TTC 113, WD4MIZ 102, W7YU 98, WB4KSG 81, W4JLS 78, N4TE 73, AA4AT 72, K44FV 62, WD4MIS 61, K4BL 59, K4IAR 59, N6ANQ 58, WB4ZTR 56, WB4FLT 55, WB4KIT 50, KB4CAU 47, KB4PW 45, K4JUM 44, K4BGZ 42, N6GVG 36, WB4EDB 35, N4KSO 31, WB4ZNB 31, N4UWX 28, AA4GL 27, K4GR 27, K4MLC 26, KD4NH 26, WS8A 20, N4FZA 15, KB4WT 14, W44TVS 13, K14W 10, N4FNT 6, WB4DQZ 4, WB4UHC 4, W4HU 2, W4YE 2, K0GYK 2.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT—SEC: K8QEW. STM: N8FXH. SGL: K8BS. TC: K8LG. ACC: W88FLF. Repeater Coord. W88GDY. Matt, W78L has been appointed ORS. Ollie, WD8V is new OBS for Charleston area. John Davies, W8HZA, is recovering nicely after surgery for a broken hip. N8FQN is new EC for Marshall County. Remember to join "Slow" L- WVN at 10:00 each night on 3567.

NET	FREQ	TIME	QNI	QTC	SESS	NM
WVFN	3865	6:00	831	150	31	WD8DHC
WVN	3567	7:00	223	99	31	K2BQ
WVMD	7235	11:45	724	76	31	WD8V
WVRN	3640	6:30	166	19	31	K8LG
WVNN	3730	7:30	104	40	31	K8ZGY
HILLBILLY	14290	NOONSU	131	12	4	W8YP
WVN-L	3567	10:00	192	53	31	K2BQ

Traffic: W78L 685, K88WNO 320, WD8V 291, W8YP 160, K8QEW 75, K8TPF 72, K8BF 69, WD8DHC 69, K8ZGY 51, K8KT 41, N8FXH 35, NS8U 15, NC8G 11.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Edie Sheffield, K8MQA—SEC: K4UBU. STM: KB0Z. ACC: WB0DUV. PIO: WB0FQB. OOC: K8CDN/W0JR. TC: W0JF. SGL: W0HNO/W0HNP. BM: K8OVKM. I would like to thank everyone who voted for me in the recent SM election, for myself and my section staff, we appreciate your vote of confidence for the next two year term of office. The Colorado section carries approximately 100 appointees, however, we would like to extend this opportunity to anyone in the section who might like to join the field organization as an ORS, OO, OES, PIA, ATC, OBS, and a few openings for ECs. If you are interested, please drop me a line for information. Congrats to K0ZL, EC and Dist 23 ARES for the recent SET held in Jefferson County, this was a simulated mass casualty & hazardous material exercise, which involved 8 agencies in Jeffco Co. Amateur Radio Awareness

Day, had participation from DRC & Dist. 13 ARES with WU0N & WR0S with a demo at Denver's City Park Family Day. Next week, Dist 14 in Colo Springs is planning a drill with several of the area hospitals. Nov 5th will be the RMRL Swapfest held at the Jeffco Senior Center, 6842 Wadsworth, Arvada. Contact the JESS: K8JF. Nets: CWN, QNI 62, QNF 255, QTC 52, 26 Sess. CWN; QNI 1327, QNF 2790, QTC 1305, 31 Sess. Col: QNI 969, QNF 659, QTC 69-183, 31 Sess. HNN: QNI 1756, QNF 967, QTC 144-676, 31 Sess. NCTN: QNI 329, QNF 531, QTC 168, 33 Sess. SCTN: QNI 392, QNF 495, QTC 88, 30 Sess. Traffic: K8HOA 1076, N0BQF 1058, K0YKF 866, K8SN 344, K8WIE 282, W0LVI 274, W0G 216, W0GVT 206, W0LJF 200, W0B0T 192, N0BVC 180, N0HFZ 97, N0CYR 70, K80Z 28, N0KIA 20, K8CNV 16.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. DEC: WD5HCB. STM: ND5T. NMS: WA5UNO, KA5NNG, W5QNR. TC: W8GY. ACC: KA5BEM. Southwest Net meets daily, 3583 @ 0230 UTC, handled 77 msgs with 127 checkins. NM Roadrunner Net meets daily, 3939 @ 0100 UTC, handled 87 msgs with 991 checkins. NM Breakfast Club meets daily, 3939 @ 6:30AM, handled 175 msgs with 894 checkins. Yucca 2-mtr Net, 78/18 handled 15 msgs with 303 checkins. Caravan Club 2-mtr Net, 66/06 with 112 checkins. SCAT Net, 66/06 handled 77 msgs with 519 checkins. Info Net 12/72, with 85 checkins. Sunday Noon Packet Net on ZIA with 46 checkins. Alamogordo Hamfest was a roaring success as it grows better each year. My pleasure following the Alamo Hamfest to go to El Paso and on Monday afternoon to present a "75 YEAR QCWA AWARD" to Jerry McTernan, ex 2BL, W3BM & now W5YV. Jerry retired from Bell Labs and has worked with Raymond A. Heising, who invented plate modulation, with Colpits & Hartley, who invented the Colpits Oscillator, with Curt Sturba, Charley Litton and Jerry played guitar and sang with Fred Waring!!! Traffic: K5SVF 106.

UTAH: SM, Rich Fisher, NS7K—SEC/STM: Jim Brown, N47G. PIO Lon Stuart, W7ME. The Utah Amateur Radio club had a booth at the Utah State Fair. Every club was invited to help man the booth. Good show. The Ogden Amateur Radio Club have a new controller on the 146.90 machine and plan to link it to 146.82 soon. This is an open autopatch. To use it, * then the number to close # Good job. I would like to know how the Section feels on having a Utah ham fest. This would be using all the clubs to work the thing up. Please let me know how you feel. 73 de NS7K. Traffic: WA7MEL 76, N7JLC 73, K07H 4.

WYOMING: SM, Jim Raisler, N7GVV—KC7AR reports Cowboy Net held 23 sessions with 530 QNI and 10 QTC. Traffic: W7TZK 160, W7SOT 207, N7NH 445. 15 Sheridan hams provided communications support for the Aug. 20 Triathlon, including packet stations relaying race progress from Lake De Smet to race Headquarters. The Casper ARC's quarterly newsletter had a report about Mike's NS7Z, experience the night of June 3 operating BY1QH. Who said hamming was a dull hobby? The 1990 Hamfest will be held in Cheyenne on June 2-3. Wil, WB7RRZ, wants to have suggestions from hams as to what YOU would like to see, and have, at YOUR hamfest. Send any suggestions to Wil Sellner, 930 Western Hills Blvd., Cheyenne, WY 82009.

SOUTHEASTERN DIVISION

ALABAMA: SM, James Spann, W04W—ASM: W4XI. SEC: KB4GDN. STM: W4PIM. PIO: KB4KCH. ACC: AA4BL. OOC: KF4VS. SGL: N4FRQ. BM: K4AZXL. As many of you have heard by now, I will not be a candidate for Alabama SM for the next two year term. I have had a number of great experiences during the past two years meeting amateurs from all over the state, but my family and business must come first and I don't have the available time to do the type of job I would like to do. The candidates running for SM (at the time this is being written) are Mildred Cullen, AA4XF, and Joe Smith, WA4RNP. I suggest you look closely at these two candidates and then take the time to vote (your ballots will arrive in the mail). In Mobile, the N4PRQ BBS system is now on line on 145.01 MHz. New packet nodes in the Gadsden area include GAD2 on 145.61 MHz, and GAD4 on 433.80 MHz. The Gadsden ARC sponsors the Alabama Emergency Net "Y" Tuesdays at 8:30 p.m. on their 147.16 MHz repeater. The Birmingham ARC sponsored a SKYWARN training class October 21 at the studios of WVTM-TV. I hope all other ARES groups in the state follow this good example - we must have more trained severe weather spotters! BPL: WA4JDH. PSHR: WA4JDH, W4PIM, W4CKS, W4QAT, WA4RNP, W4IBU. Traffic: WA4JDH 706, W4PIM 200, W4CKS 151, W4QAT 82, W4DGH 18, W04W 12.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM: KC4MJ. SEC: NC4E. STM: WB4WOL. PACKET: W4QO. ACC: KM4IH. BM: AA4UA. OOC: W4TG. PIO: W44LE. SGL: WB4UVV. TC: W4ZTL. If you noticed the Section staff is once again complete. The new bulletin manager is Jim Oates, AA4UA of Blythe, WA4LLE, Archie McKay of Valdosta assumes the Public Information Officer post & Tom Ingle, W4ZTL, of Stone Mt is the new Technical Coordinator. If you or ur club need any help in any of the above areas, please contact them. At the annual meeting & election of officers of the GA SSB ASSOCIATION held in Macon on Aug 28th the GA AMATEUR OF THE YEAR AWARD was presented to Jim Foust, WB4LBM, of Decatur. He was also elected Pres for the 1989-90 year. N4OTC was elected VP, W4HON Sec/Treas, Directors are: WB4ZMH & WA4EPK. The Atlanta ARC (2nd largest in the US) elected a YL as its Pres, Sharon Foster, KM4IH. VP: KM4KB, Sec: N4MNR, Treas: K14Y & N4UCK as Act Mgr. Only one Silent Key to report WA4IOL of Savannah. Our sympathies to his family & friends. ARC of Aug elected N4TUM as Pres. N4JA as VP & WB4AIU as Sec/Treas. As usual the gang down at Colquitt County did a FB job with their annual SUNBELT EXPO '89. K4SEX was a SPECIAL EVENT STATION during the '89 POWERS CROSSROADS ARTS & CRAFTS FESTIVAL. Y'ALL come to Lawrenceville on Nov 4 & 5 for a big week-end at the HAMFEST-COMPUTER FEST. The bone yard is worth the price. Athens ARC has the full leadership. Pres: AA4AT, VP: W44IML, Sec: KC4BDT, Treas: N4CUA, Editor: N4ULL. I have noticed that the OI timers are giving our newer hams an opportunity for leadership in their clubs & organizations. This is a way to get new blood with new ideas etc. Let's all see if we can't generate some traffic during the forthcoming holidays & keep the traffic people busy. A HAPPY THANKSGIVING TO YOU AND YOUR FAMILIES. 73 and GOB BLESS, EDDY.

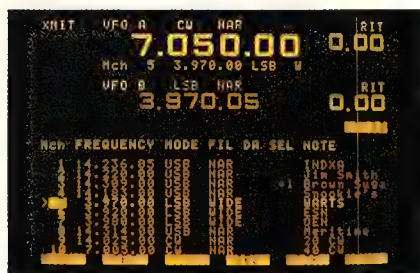
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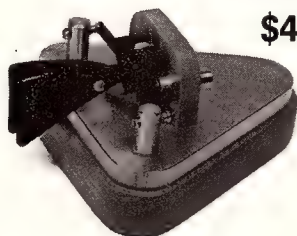
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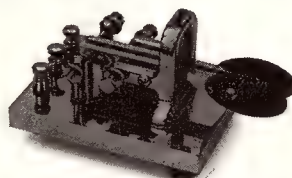
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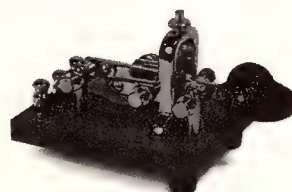
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Presentation	\$135.00
Deluxe	95.00
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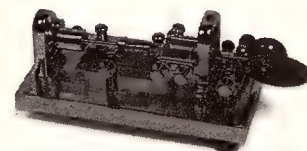
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NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—ACC: Dick, WA4BIH, OOC: John, AB6I, SEC: Rudy, WA4PUP, STM: Cotton, KB9LT, ASM: Bill, KB4LB, SGL: John, KC4N, PIO: Patey, WA4POU, BM: Dave, N4GMU, TC: Ed, W0RAO. As this is being written, the Region II IARU meeting is being held in Orlando and local hams are helping to make the meeting a success. W1AW/4 has been set up and arriving delegates are being greeted and assisted at the airport. The Orange County ARS members who have helped are: KF4WS, KB4RTG, WA4HYJ, N4OYA, N4TRN, KJ4DG, N4OWZ, N4MWL, WB4NTI, WD8BOY, and WB4HXS who organized the group and spent many hours at the 2 meter station in the Airport. Thanks, Bill and the rest. Also KL7IV and W7JIE were part of the greeting group. The Antenna crew, under the direction of our TC, Ed Cox, W0RAO, put up a tri-bander 3-element beam as well as an all band vertical so two stations could be operating on different bands. In the 90+ degree heat, the following finished the job by 2:30 PM Sept 2nd: WB4HXS, W4MCV, N4NVW, NE4H, KB4QKB, N4OZD and N4ADI. At 3:00 PM (1900 Z), W1AW/4 was activated with K1ZZ, making contacts on 21 MHz. The station plans to be active thru Sept 8th, with numerous local ops at the controls. The visiting delegates will have many opportunities for operating when they are not in conference or committee meetings. W1AW/4 QSL cards are being signed by the station operators and will become a cherished possession for the stations lucky enough to be at the right place at the right time! Hil it will be a busy week and a once in a lifetime event! We're all pleased to be a part of this IARU Region II event! 73, N4ADI.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—STM: K4ZK, SEC: W4SS, TC: K1AT, BM: WD4KBW, PIO: N4PBF, AAC: W4TAH, ACC: K4EUK, SGL: KC4N, PKT MGR: K4CY. Congrats to W4DPH and KC2FF, two PBBS in Clearwater, who were recommended for the new National Traffic System Service Award by K4SCL. The certificates were forwarded to K4SCL for presentation. I am very sorry to report that W4ILE is now a Silent Key. Regis was well known in both Dade and Hernando counties through his association with Amateur Radio. He was the editor of the first Florida Traffic Routing Guide, served as SCM for Southern Florida, the first editor of the Florida QFN traffic bulletins, and instrumental in the establishment of the Cloverleaf ARC and the QCWA Chapter 148. The Motorola Repeater located in Sunrise will be presented the National Traffic System Service Award at the Melbourne Hamfest in recognition of their support of the Southeast Florida Traffic Net. WB4WBK reports that during the past two months the Highlands ARC has provided communications for the TOMOKA ROWING SPRINTS, HARDER HALL GOLF CLASSIC, SEBRING 4TH OF JULY PARADE, WORLD WATER SPEED RECORD ATTEMPT, NATIONAL SECURITY EXERCISE as well as ARRL Field Day. Sadly the speed record attempt ended in tragedy with Craig Arfons dying from injuries received when his boat flipped near 375 mph. On the bright side a 13 year old boy passed the Novice exam while Field Day was in progress. N4ORZ reports that N4SMY has been elected Dade Emergency Net manager for a six month term. The Motorola ARC, Marconi reports that a study is being made to replace the field day tower. The Englewood ARS is setting up a table at a local Publix in September to let the public know that an evening Novice class will be offered. The Englewood club celebrates their first anniversary of ARRL affiliation this September. Congrats. The Martin County, Common Emitter says the club is starting a General class this September. The Everglades, Beam indicates that KD4BU suggests that they can start up a 10-10 chapter if there are enough interested. News from N4PBF, PIO, reports that the Hollywood ARC will have an exhibit of Amateur Radio at Pioneer Day at Port Everglades during September. He also said that the Eastern Airlines Radio Club is reorganizing, changing its name and relocating its 2M and 440 repeaters—nothing definite as yet. KA4FZI was presented THE OUTSTANDING SERVICE AWARD FOR 1989 at the August meeting of the Fort Myers ARC. At the same meeting WA4PFK presented Certificates of Merit to the Fort Myers ARC for their outstanding assistance in the Amateur Radio class taught by KA4FZI. Certificates of Merit were also presented to K4KCP and KC4EGO who gave one day per week the past school year in assisting KA4FZI in her work with Amateur Radio students at Caloosa Middle School. At this same Fort Myers ARC meeting WA4HDH, Doc, a TWENTY SIX YEAR member of QFN and Tuesday night NCS for almost that long was given a Certificate of Merit for his labor of love in writing and having printed QFN - The History of the All Florida CW Traffic Net. Be sure to contact Doc for your copy. KB4KXV reports that 142 messages were sent during a 22 hour operational period while the aircraft carrier, USS John F. Kennedy, was at Port Everglades. Amateurs assisting were K4BUG, WD4WN, WA9VND, WD4BWC, KB4THK, WA4PWT, and KB4KXV. The South Brevard ARC, Spark indicated that the club once again provided 2M communications support for the eighth annual BARGAIN BEACH RUN, a 10 kilometer run on the beach. They also printed a traffic handling tip that should be of interest to beginning traffic handlers—DO NOT END A RADIOGRAM WITH AN X-RAY. A copy of a letter to ARRL was received from AB4BC, President of the Rascal Milgo ARC. It was quite interesting-included was info that since the club had not participated in Field Day in several years they decided to rekindle interest by challenging three neighboring company clubs. This became known as the "South Florida Challenge". The Rascal Milgo ARC against Motorola Plantation ARC, IBM Boca Raton ARC and the Motorola Boynton Beach ARC. The outcome is uncertain at this writing but a great time was had by all. The letter was so interesting I wish I could include all of it - but too long for here. The company gave permission to use one of the several Spanish style tiled roof "gazebos" at the rear of the property in Sunrise. It is located in a bird sanctuary on company property and sits astride a small lake about one mile east of the Everglades. The lake includes bass, turtles and a couple of alligators. The site sounded just beautiful! The setup of antennas using slingshots, the rain, mosquitoes, the minor foulups, and the 3.5 kW gasoline generator which surged to an overvoltage completely destroying all of the surge protection devices certainly contributed to a memorable Field Day for all! K4FQU noted in the Southwest Florida Traffic Net stats that WA4EIC was liaison to FMTN for 22 of the 27 sessions. WD4KBW said there were 51 bulletins received and 69 transmitted by WA4EIC 72, WT4F 22, K4IEK 22, WD4KBW 16 and WA9VND 8. The ARRL Information Net meets on 3940 kHz each Saturday morning at 8 AM. 73 de WA4PFK. Traffic: W3CUL 3356, W3VR 909, WA9VND 522, WA4PFK 419.

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NOMINAL ATTENUATION
MHZ db/100

• Semi-Solid Polyethylene
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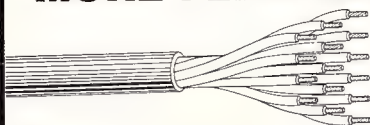
9 1/2 awg Solid Copper
Center Conductor

MHZ	db/100
50	0.9
100	1.4
200	1.8
400	2.6

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International's #9086 RG 8/U Coax
with 95% T/C braid coverage, low attenuation
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MORE FLEXIBILITY AT LESS COST.



International's Antenna
Rotor Cables

Cat. No.	No. of Conds.	Awg. & Stranding	Ins. Thick.	Jkt. Thick.	Nom. O.D.	Working Voltage	Jacket Color
8610	8	2-18 (16X30) 6-22 (7X30)	.018 .010	.032	.250	200	Black
8612	8	2-16 (26X30) 6-18 (16X30)	.018 .012	.032	.345	300	Gray

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Mil-C-17 D Type Coax

Center Cond. Gauge & Strand	Insul. of core	Shield	Nom. IMP.	Nom. CAP.	Nom. VP%	Nom. O.D.	Nom. MHZ	Atten. DB/100'
13 (7x.0296)C	Poly- ethylene	BC Braid 97% cov.	50	30.8	66	.405	100 200	2.2 3.2

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VIRGIN ISLANDS: SM, Ron Hall, KP2N—ASM: KV4JC. SEC: NP2B. STM: NP2E. NM: VP2VI. We all have been busy tracking tropical storms coming across the Atlantic into our area. Local nets have kept the boating community informed of any possible danger with up-to-date weather information. St. Croix ARES reports 4 sessions QNI 50. St. Thomas/St. John ARES reports 4 sessions QNI 22 with 1 training meeting. We now can receive/send NTS traffic via KP4GY. HF Packet station. This is a backup to the 3710 traffic net that KP4DJ runs every day. We can now run third party amateur to amateur traffic between the US and the BVI starting Sept 1. VP2VA is working on full third-party agreement. The KP2A 6 meter beacon is on full time 50.110 and ready to give out a VI QSO. John also reports no multi-multi operation at his station this year, just multi-single. The VI QSL Bureau has received over 75 lbs of cards this year so far. Traffic: NP2E 8, KP2N 7. 73 from "America's Paradise" de KP2N.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NM'S: K7POF, K6LL, K16ZH. Saw several familiar faces at SW Divn Convention in L.A. Janet, N7JWM and Bill, N7JWN from Flagstaff; Gary, W7GH and Cameron, W7OIF from Phx., and Merrill, W7HT from Tucson were on hand as well as others from our section. Vallery, RA9YD from Siberia was introduced at the convention banquet. He had just left Flagstaff where he was entertained by Coconino ARC after rafting trip on Colo. river. Hope to have more details on this project next time after W7YS, NN7A and NN7D return from their exchange trip to U.S.S.R. Banquet keynote speaker was Ken Cameron, KB5AWP who is a NASA astronaut and command pilot. Ken gave interesting and informative data on Space Shuttle missions. He is scheduled to fly on STS-29 as Capsule Communicator early next year and plans to QSO with hams when time permits on this mission. Alan, WC7R Prescott sent in FB report on ARES activities there. Included were a simulated air crash drill with W7J and K47YCI handling emerg. comm. with FAA, County, City and Embury Ridder Univ. A Fourth of July parade was covered using their EOC and HT's at various positions. Participants were: W7KEE, K7DWM, N7GTK, W7J, N7NBK, W6UMV, and WC7R. Also covered in similar fashion was the Prescott Triathlon/Biathlon with additional stns W7HWX and KB7FRV joining in. Thanks, Alan and keep up the good work. Through the joint efforts of TRA, RACES, ARES and other various clubs in the Tucson and Pima Co. area, 829 amateur operators donated a total of 9,004 hours of various public service events in 1986, 87 and 88. (Tnx, Solid Copy). Clubs and nets please take note. We need more documentation of our public hearings for justification of amateur rights such as antenna ordinance restrictions, etc. The 2nd annual SOWP/QCWA Christmas lunch will be held Dec. 2 starting at 11:30 A.M. at the Holiday Inn, 2532 W. Peoria Ave., Phx. Barry Goldwater, K7UGA will be guest speaker. For further info and reservations contact Wm. T. Jackson, SOWP, 4247 N. 82nd Dr., Phx. 85033, or phone 602-849-9411. Also, don't forget annual Superstition ARC Swapmeet Dec. 2 - 3 in Apache Junction. Summer activity reports are down. Now that fall and winter activity is picking up, how about sending in some reports? I can only print what I get from you. 73 and CUL. JIM.

Net	Abbrev	QNI	Traffic	Sess	Liaisons
SouthWest Net	SWN	NO REPORT			TWN
Arizona Cactus Net (HF)	ACN	NO REPORT			TWN
Arizona Cactus Net (VHF)	ACN	No Report		ACN	(HF)
Arizona Tlc & Emerg Net	ATEN	275	140	31	TWN

Traffic: W7AMM 877, W7EP 126, K7RLL 83, W7OIF 61, K7POF 34, W7KXE 30, N7ETP 10, WW7P 9.

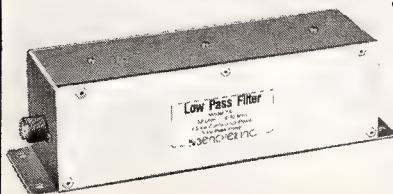
LOS ANGELES: SM, Phineas J. Icenbice, Jr. W6BF—HAMCON-89 is over and it was a big success thanks to all the dedicated help and our Chairman Joe Circa, KB6AXK. Sixteen of our outstanding local clubs invested money and ran this ARRL Division Convention. Members of these clubs are the real winners. They now have experience, knowledge, publicity and money. More of the first three and less of the latter. We had 450 at the banquet and a great guest speaker Astronaut Ron Cameron, thanks to Bev. WA6TIU. N6MAD, Kathleen reported TRAFFIC for August 362 with a new leader KD6CK, 111, N6NYK, 89, 46 for N6AHT and 44 for KC6BCC.—WW7K Dave Morse our new OOC is looking for more good OO's. Volunteers who want to work! Call Dave on (818) 893-2817 if you think that you qualify. Dave also needs workers who speak Spanish and/or read code at 25 wpm or better.—Capt. Keith Bushey, LAPD, KF6UJ, called last week with some facts on Emergency Antenna Towers. The General Services Files of Los Angeles show (not counting mountain tops) thirty—(30) towers over 100 feet.—ANYONE SEEKING ANTENNA ORDINANCE relief from a city should point out city contracts with ARRL Section Managers for emergency services. In LA County, the ARRL Sec Mgr has a contract with the City of Los Angeles, Long Beach, and we are working on more. Since ARRL has an emergency communications contract with the City of LA, it only seems fair that most licensed Amateurs also need EQUALLY adequate towers.—The City Police have 10 towers over 120 feet tall! ARES members fight for your right to have adequate ANTENNA HEIGHT for that big Emergency. Our great ARES group under the direction of Ron Boan, AK6Y, is available for your call at (213) 596-7449, if you can help. Ron is also coordinating Emergency Operations for the SW Division as well as the Los Angeles Section. Foreign license information is available from ARRL HQ. (They keep up to date)—Several have asked about the HANDI-HAM organization. The HANDI-HAM address is 3915 Golden Valley Rd., Golden Valley, MN 55422.—(612) 520-0520—They provide a quarterly publication, cassette

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The amazing IC-32AT operates full duplex on 140-150MHz and 440-450MHz with five watts output on both bands. Also receives 139-174MHz and stores any Tx and subaudible tone offset in 20 memories. Truly an FM'ers dream rig!

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TRAP DIPOLES

Model	Bands	Traps	Length	Price
D-42	10/15/20/40	2	55'	\$64.95
D-52	10/15/20/40/80	2	105'	69.95
D-56	10/15/20/40/80	6	82'	114.95
D-68	10/15/20/40/80/160	8	146'	149.95

TRAP VERTICALS—"SLOPERS"—

Model	Bands	Traps	Length	Price
VS-41	10/15/20/40	1	28'	49.95
VS-52	10/15/20/40/80	2	49'	64.95
VS-53	10/15/20/40/80	3	42'	74.95
VS-64	10/15/20/40/80/160	4	73'	94.95

*Can be used without radials

*Feedline can be buried if desired

*Permanent or Portable Use

ALL TRAP ANTENNAS are Ready to use - Factory assembled - Commercial Quality - Handle full power - Comes complete with: Deluxe Traps, Deluxe center connector, 14 ga Stranded Copper Weld ant. wire and End Insulators. Automatic Band Switching - Tuner usually never required. For all Transmitters, Receivers & Transceivers - For all class amateurs - One feedline works all bands - Instructions included - 10 day money back guarantee!

SINGLE BAND DIPOLES (Kit form):

Model	Band	Length	Price
D-10	10	16'	\$17.95
D-15	15	22'	18.95
D-20	20	33'	19.95
D-40	40	66'	22.95
D-80	80/75	130'	25.95
D-160	160	260'	34.95

Includes assembly instructions, Deluxe center connector, 14ga Stranded Copper Weld Antenna wire and End Insulators.

LIMITED SPACE DIPOLES



- Reduces overall length over 40%!
- "Shorteners" are enclosed, sealed, weatherproof and lightweight.
- Complete with Deluxe Center Connector, 14 ga. Copper/Clad antenna wire, end insulators, and assembly instructions.
- Use as inverted "V", or flat-top.
- Excellent for all class amateurs.

Model	Band	Length	Price
LS-40K	40	38'	\$44.95
LS-80K	80/75	66'	\$49.95
LS-160K	160	100'	\$49.95

• Any single band, or Trap antenna with "Pro-Balun" instead of Deluxe Center Connector; Add \$8.00 to antenna price.

COAX CABLE: (includes PL-259 connector on each end)

Type	Length	With antenna purchase	Separately
RG-58	50'	\$9.00	\$11.95
RG-58	90'	13.00	16.95
RG-8	50'	21.50	25.95
RG-8	100'	36.00	39.95
RG-4X	50'	11.95	14.95
RG-4X	100'	18.95	20.95

"PRO-BALUN"

• 1:1 For Dipoles, Beams & Slopers \$17.95

- Handles Full legal power
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- Lightweight, Sealed & Weatherproof
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- NO jumper wires
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ALL BAND — LIMITED SPACE ANTENNA



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- Perfect for All classes of Amateurs
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tapes and special services for rehabilitation and independent living services to children and adults with physical disabilities and speech, hearing and vision impairments. The Courage Center is a nonprofit United Way organization. Membership in HANDI-HAM System will not be denied to anyone who qualifies by reason of interest and disability. Equipment loan and purchase, equipment repair, equipment adaptations, Radio Camp and educational services will be available only to those who do pay the ten dollar annual fee, however. 73. Phineas de W6BF. Traffic: AJ6F 502, K6UYK 292, W6TH 131, W6INH 128, N7CZF 59, W6SNA 36, W6NKE 26.

ORANGE: SM, Joe H. Brown, W6UBQ—ASM: Riv Co, Bob K6LKN (714 685 3823). ASM Org Co, Ralph W6BIB (714 776 9272). ASM SARA Co, Ken W6ZEF (714 983 1272). ACC Sandy reports the MVARA new officers, Pres Larry KA6GND, VP Bob N6MYZ, Tre Robert KC6EOS, Orange Co ARC Officers Pres Frank W6VKZ, VP John W6AGK, Sec Bob KD6XO, Tre Mark KJ6JC. Views, it is time again to start thinking about what office you would like to run for in 1990. There will be openings, de K6KCV (BPARC). What direction do you want your club to go? Helping to manage a club is time consuming, but it is fun, so think about getting involved. de K6NU (ROARA). Victor Valley ARC officers and supporters have been meeting to formulate a new public service comm plan to provide support for public activities by improving coordination and increasing safety at many local events. This will increase the public awareness of Amateur Radio and improve its image, de K7YCI. The Mile High ARC, San Jacinto Mt. area, a new club (new kid in the block) meets 1st Wed of each month. Pres. George K6DOI, VP Dick, KC6EOC, STM Dan W6FO sez Jerry A0BA will be stepping down as SM of SCN on Nov. 1. Jim, N6NLW, NM of SCN2 will be taking over. SCNv has moved to the Crestline rpt (146.85-) 9 PM local. Many trx to that group for making the rpt available on short notice. Tune in, take a msg for delivery or send one, they go all over the world. Traffic info, BPL W6FO, PSHR W6FO, W6SX, KA6HJK, N6ADV, KA6TND. Totals W6FO 570, W6SX 202, K6ZCE 123, KA6HJX 112, ADAA 82, KA6GND 41, KA6TND 34, W6CFB 33, KB6VPI 14, BBS TFC N6IDV 31, N6KZB 94, N6P6 144, KD6SQ-2 400. ASM: Mike N6KZB, packet racket. N6KZB and KD6BQ-2 now on AX4 RE software to better handle NTS and routine msgs. Riv. Co RACES provided new ants and cavity for the 223.42 mhz mode system in SOCAL. Trx to Orv W6WEY. The 4800 node link at 51.12 will be a reality soon at Elsinore peak. Riv. Co. Fire/CDP supporting this project.

SAN DIEGO: SM, Arthur R. Smith, W6INI—STM: N6GW. PIO: N6PKY. TC: N6JZE. SEC: W6INI. The Southwestern Div Conv for 1990 will be held in San Diego Aug 24-26. Led by K7DCG and KA6PXD, 100 S D Amateurs provided emergency medical comm at annual Blue Angels air show, Aug 12-13. For info on SANDARC volunteer exams call 619-465-3926. Food for thought: Would our PR improve if we called ourselves Amateur Operators rather than Hams? Upgrades: AA6PN to Extra; KJ6PH, W6ROW to Advanced; KC6ADV, KC6EEF to Tech. KF6BB, EC Southern Dist, made following appts: N6QJM NCS 2m, N6QLN NCS 10m, AA6JE Ops Asst, K6SJA Red Cross Ln, KA6OMK Publicity. ARC of El Cajon sponsors a swap meet monthly, on 1st Saturday, at the Santee Drive-in theatre. Time: 0700. Escondido ARS runs a T-hunt monthly on 3rd Saturday at 0930. Talk-in 0900 on 146.88 (-). KF6BB won first place in S D Section in 10m fone contest. NCTN: (Jul) 30 sessions, 113 msgs, 404 ck-ins; (Aug) 30 sessions, 75 msgs, 428 ck-ins. Traffic: (JUL) K6I2H 290, K6I2M 94, N6RVO 51, K6BPCF 45, N6GW 27, N6TEP 18, WA1ZEN 17; (AUG) K6I2H 552, N6GW 36, KC4IRP 35, K6I2M 33, N6DSC 17.

SANTA BARBARA: SM, Thomas I. Geiger, W2KVA—ACC: KB5AH; ASMS: N.Vntra-N6MA, S.Vntra-WBAKF, Sbar-WB6BYU; BM-N6TNG; STM-N6WP; OOC-WBAKF; TC-W6KFV; SEC-WB6IY; DECS: Vntra-WB6RVA, S.Sbar-KA6KGF, N.Sbar-K6IXG, SLO-WB6IY. The Santa Barbara Amateur Radio Club held another very successful hamfest on August 13th. The event was attended by hams from all over the Section and even a couple of "DX" amateurs. Our Division Director Fried Heyn, WA6WZO, and his lovely wife Sandi, WA6WZN, joined in the festivities and took the opportunity to congratulate SBARC on their election as a Special Service Club - a designation most thoroughly deserved by this public spirited group. It wasn't all speeches though, as there were games and activities to keep everyone happy until the BBQ was ready. WB6BYU even staged another of his infamous "Handed T Hunts" and then entertained us with song after the meal. Don't miss this fun event next August... it gets better every year. The month ended with the Southwestern Division convention which featured an interesting series of technical sessions, including a seminar moderated by N6NB who was joined by some of the country's foremost experts on biological effects of electromagnetic radiation. The convention highlight for many was the Saturday night banquet which featured a presentation by Lt. Col. Ken Cameron, KB5AWP, who will be Capsule Communicator for STS-29 and subsequent Space Shuttle missions. Ken gave us an insight into life aboard the Shuttle from the astronaut's viewpoint - an interesting and entertaining program for all. Of special interest to our Section was the presentation of a new award by our Division Director. Fried presented the Santa Barbara ARC with a plaque naming them "Outstanding Club in the Southwestern Division," citing the ARES Van, training and technical advancement programs, the club station at the Santa Barbara Red Cross building and "Key Kik" which must surely be the best Amateur Radio club magazine in the country. SBARC President Don Fuller, KA6KGF, proudly accepted the award on behalf of the members. The SSC designation and the award are both more than deserved, being just recognition for many years of dedication and teamwork. Herewith a hearty "WELL DONE" to Don and the members of SBARC. HOW TO GET MENTIONED IN SECTION NEWS: Some of you have commented that news coverage in this column seems unbalanced - those in the south seem to think the north is better represented, those in the north say the same about the south. This is natural and understandable, since we all tend to look for news about our own communities. What follows is presented with a view to helping you get the coverage you want - please bear in mind that I will not overlook accomplishments in any area in order to provide more "balanced" coverage, and that I can only print what I know about. This column is written in the first week each month. My deadline to ARRL is the 10th of the month. YOUR deadline to me is, therefore,

the 5th. This will allow me to compose and edit the column for transmission to Newington. The column appears in QST two months after it is submitted, thus the May column was written in early June and appeared in the August issue. It should be apparent that most "news" in your club magazine is too old to be newsworthy in a QST column - the time lag from event to publication might be four months or more. Keep these timelines in mind, particularly for announcements about upcoming events, send me the information you want published by packet (W2KVA @ N6AZD) or by mail (see QST page 8) and you stand a very good chance of getting a mention in this column. I'm always happy to report on the accomplishments and successes of our Section amateurs, and more than happy to support your club's events with advanced publicity. Finally, if there are things about this column that you DO or DON'T like, please let me know - that's the only way we can tailor the column to meet your desires. We note with sadness the passing of George Maki, "CW," 6GF, W6BIE. George's 55 years of hamming spanned the age of spark to the age of satellites. His delightful tales of wireless, part fact, part fiction, will be missed by us all. Our condolences to his wife, Vi. August testing successes: SMRA VE (ARRL): To Extra - WA6AHX; to Advanced - W6MPR, KC6EBP, KB6ULB, KB6UMZ; to General - KB6AED; to Technician - KB6WIP, Steve Vasconcellos (Turlock, callign pending); to Novice - Ron Loper (Simi Valley); VEs - N6SR, K6JTK, W6BNO, W6HW, W6BKF, W6MUL, K6VK, AA7AA, W6TKF; Non-VE assts - Laura Schroeder, Margaret Myers, KA6WZR, WR6S, SBARC VE (ARRL): To Extra - KB6YNY, K6KME; to Advanced - KB6UXI, KB6YGH, Truett Thach (unl), N6OXW; to Technician - KC6AYP, KC6EJC, KA6YAE, KC6AVJ, Karl Metzger (unl); VEs - KB5AH, AA6OT, WR6V, KB6ILQ, WA6VNO, N6PIM, AB6S, N6NLW, AA6JG. Congratulations to all and thanks to the VE and Non-VE volunteers. 73 for all, de W2KVA. Traffic: WBAKF 4934, N6NLW 123, V3AWEW 63. (Jul) WBAKF 3959, (Jun) WBAKF 3546.

WEST GULF DIVISION

NORTH TEXAS: SM, Dan Dansby, W5URI—The North TX Section Amateur of the Year Award will be presented next year at the Arlington Hamfest in June. Rules are being written now and will be published in the Section Quarterly Newsletter. Any individual or organization would like to sponsor this award may contact the SM for details. Congratulations to KA6NGG for being appointed the RACES Coordinator for FW/Tarrant Co. Good luck, Lamar. Once again, K5UPN and K5BBL have made BPL for the month. Congratulations to both of you. Traffic: K5UPN 933, K5BBL 541, W5TNT 343, K5MXQ 163, K5PRC 128, K5SNG 103, N5NZH 100, K5ML 95, K5BJV 17, N5KCI 21, W9OYL 58, AC5Z 22, KB5BNU 18, WA4DZT 14, W5MP 8.

OKLAHOMA: SM, Joe Lynch, N6CL—The exciting news this month is the link of the Tulsa AAARC UHF repeater with the Oklahoma City MORI UHF repeater. With the MORI UHF repeater already linked to the 146.94 repeater this gives access for Tulsans to Oklahoma City on VHF. Plans exist for a VHF input in Tulsa on 147.00 and other repeaters around the state to have a feed into the MORI UHF repeater. A statewide link of repeaters is becoming a very real possibility. Other news: Your SM visits the Ice Cream Social put on by the various Tulsa Clubs along with the Broken Arrow ARC. Your SM also attended a meeting of the Enid ARC. Their hamfest will be on Nov 4 with talk-in on 145.29. Your SM attended the Amarillo Hamfest and met with Milly Wive, W5OVH, WTX SM concerning mutual aid and crossover communications. A tentative meeting is set for sometime in the Spring with Millie, her and hams from the panhandles of Oklahoma and Texas. Ham classes are under way around the state. Check with your local club for the one nearest you. 73. Joe. Traffic: N5IKN 123, K5CXP 99, K5GBN 61, WA5OUV 60, N5FEM 54, W5OHK 54, AA5GI 39, WA5OGC 36, WA5ZOO 30, NQ5Y 8.

SOUTH TEXAS: SM, Art Ross, W5KR—STM, W5GKHK. SEC, K5DG. PIO, WA5UZZ. BM, WA5YDD. BM, WA5WY. TC, N2SU. OOC, K5SBU. SGL, K5JKN. ASM, all of above plus N5TC. Big news in the Section remains KB5AQV having been selected for one of Amateur Radio's most prestigious prizes: The Hiram Percy Maxim Memorial Award; full details elsewhere in QST, but Clear Lake ARC is real proud of Kevin. CLARC also turned out for Hurricane Chantal; EC W5EEV, KH6FHS, K5BY, WA5LOO, KA5GLX, W5DEFCE, W5CLW, K5HV, PIA KB5AWM, KB5AQV, KB5WKK, N5JVV, N5GIN, N5GFS, W5DEEU and N5OLU helped the cause; KB5AQV and KB5EQ taught, KA5GLK and KB5AWM tested the Novice class and 9 new Novice class amateurs emerged. PIA KA5EEQ, Brenham ARC, doing excellent job getting club coverage in local media. "Scrambled Scribbles", bulletin of the Hams 'n Eggs Society of La Grange, rpts KF5ZL is newly appointed DEC for Harris County and 5 surrounding counties, plus RACES Officer for Harris and 13 surrounding counties; gives kudos to W5QPR and N5GZV for upgrading to Advanced class. Central Texas Traffic Net (CTTN) NM N5NAV rpts 224 messages in 62 August sessions; 572 ck-ins; NTS liaison for all sessions. OBS W5KLV rpts 4 propagation fests, 4 bulletins given 31 readings on 7 nets. The Hill Country ARC, Kerrville, rpts club again provided communication for July 4 VFW sponsored canoe race; W5CFK, N5ASQ, KC5ZT, W5NTJ, K5TR, W5RKL, WB5TCB, K6AQV, KA5ONN, KA5SOX and N5NOY helped keep every-safe and informed. 7290 Traffic Net Secy N5FT rpts 344 messages in 50 August sessions; 3277 ck-ins; NTS liaison 2 per session; NM W5YQZ. Johnson Space Center ARC rpts fair results on Apollo 11 20th anniversary commemorative station operation, with 239 total contacts; also rpts parade operation used 2 nets in successful operation. DRN5 NM W5BYDD rpts 701 msgs in 62 Aug sessions; STX represented 100% by W5KLV, W5CTZ, W5HZQ, N5ILI, N2SU, W5BYDD. PIA N2SJ, Seguin, is newly appointed OES and rpts N5OEO is new EC for Guadalupe County, has upgraded to General Class and his wife passed Novice exam and awaits new call; CTTN hit new traffic record in August; Comal County ARES, under guidance of EC N5NAV, participated in emergency practice exercise, a first for Comal County officials; K5TK and KB5FUH "Elmering" several elementary school students and new Novices expected soon. WA2VJL reports San Benito ARC donated 2 videotapes to local library: "Tune in the World," and "Big Bird" from from Sesame Street, the latter teaching children how to

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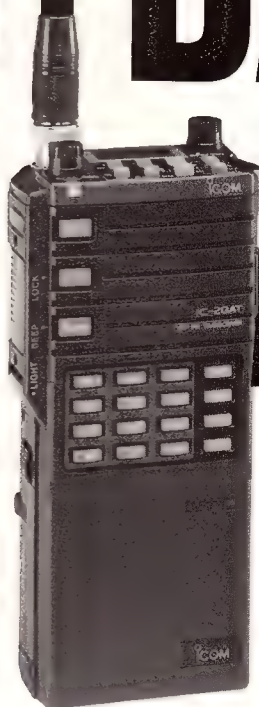


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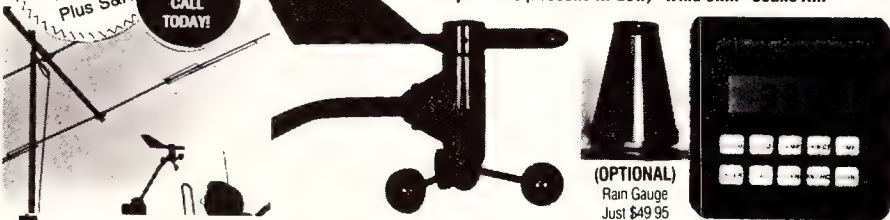
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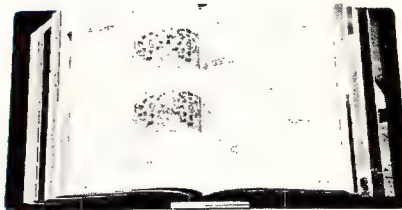
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prepare for hurricanes. B-VARC Bulletin, Brazos Valley ARC, rptd KB5JPX upgraded to General Class; KB5HMF, KB5ISX and 3 unlicensed went to Technician Class; 7 others passed various elements on road to upgrade (VERY NICE!); WB5IGG is ramrodding organization of new Novice Class. AARC-OVER, Austin ARC, announces beginning of Novice course.

WEST TEXAS: SM, A. Milly Wise, W5OVH—At the June meeting of the El Paso Amateur Radio Club, the following officers were elected: Pres. Clay Emert K5TRW. Vice-Pres. Tony McLean KB5HQE; Secretary Bill Holcombe, W5TFT; Treas. Milly Wise, W5OVH; Trustee Mel Levenson, WA5ELG. Congratulations to Ken, KB5HQJ, of Big Springs who upgraded to General class. Big Springs ARC has a ten-meter net on Tuesday night at 7:00 on 28.45 Central Standard Time. Grant, N5GOM, of Dalhart, TX has completed his WAS. Sandy McKean, W5MVJ, reports he has finally gotten Randall County in West Texas assigned with an EC and now we have 390 ARES members now signed up. The EPARC and K5WPH ARC along with QCWA members are going to hold a hamfest in El Paso on Oct 21 & 22. It will be at Western Playland. On September fourth, Jerry McNernan, W5YV, was presented with a seventy five year certificate from QCWA. Due to unforeseen circumstances, Hugh Winter could not make it so Joe Knight, W5BDY, who is Section Manager of New Mexico of the Rocky Mt. Division presented Jerry with the honor. At the W5ES clubhouse with sixty friends and QCWA members attending. W5ES El Paso Amateur Radio Club had about forty persons sign up for the new classes at the clubhouse. Alpine and the Big Bend ARC have a contest every Field Day with the San Angelo ARC and it looks as though the "Hallcrafters boat anchor" will be headed back to Alpine. Friendly competition may be the way we can get more participation in the clubs. 73, Milly Wise, W5OVH. Traffic: AE5I 144, WB5OXE 91, K5KKO 30, K5UYH 29, W5ERT 20. (Jul) AE5I 10.

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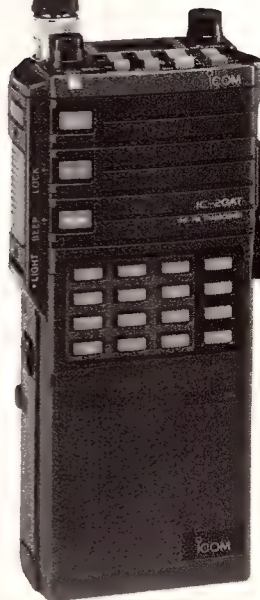
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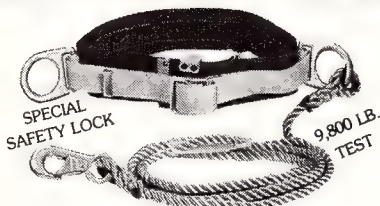
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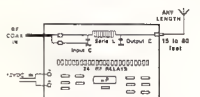
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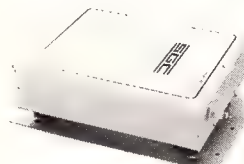


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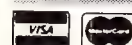
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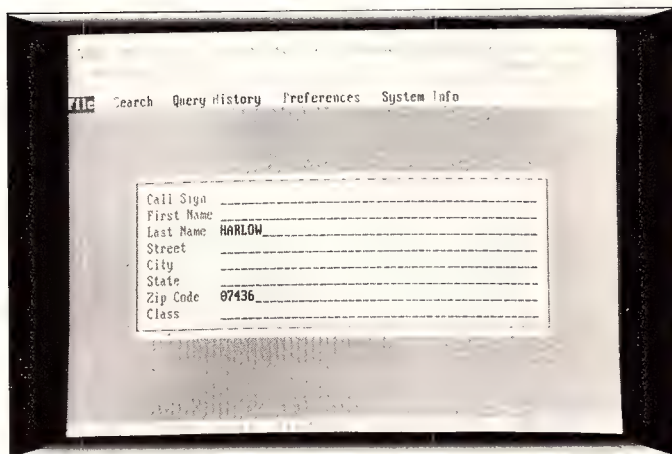
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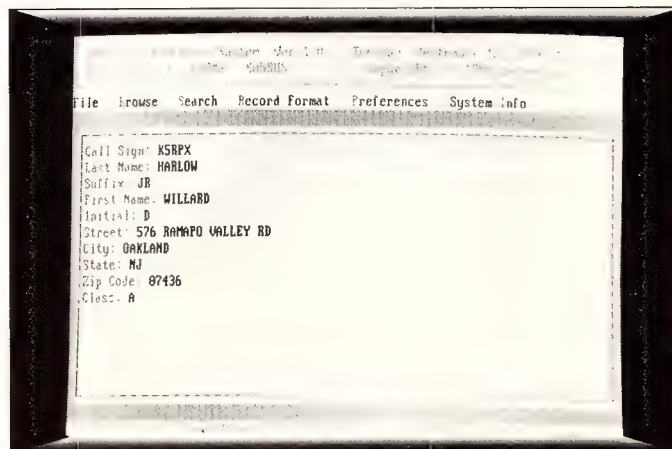
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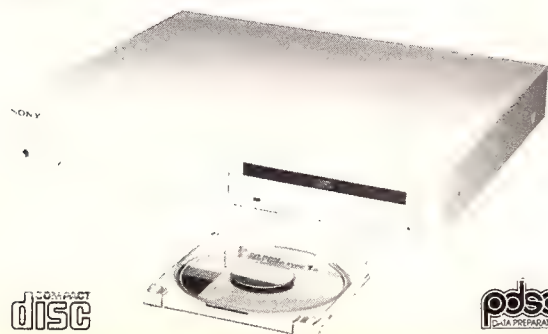
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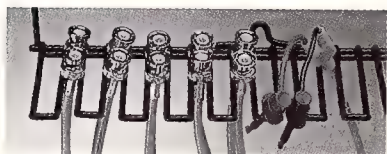


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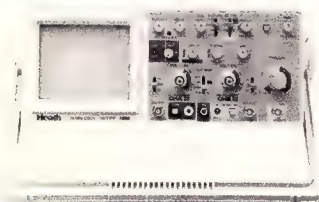
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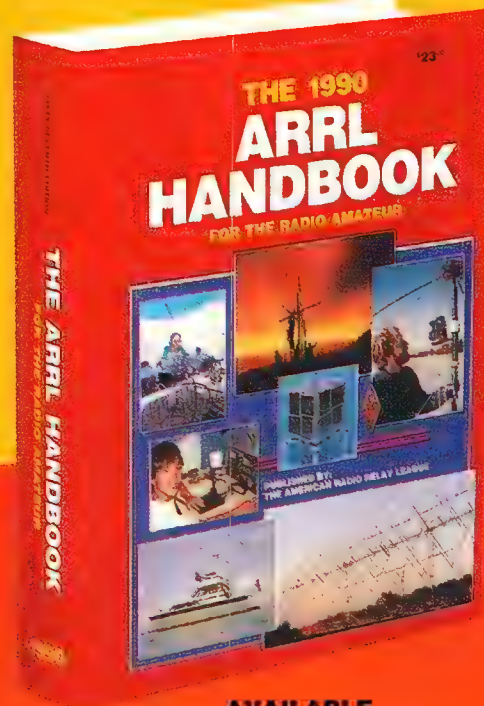
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Every ham is interested in antennas, and we've added a host of new antenna projects including three high-performance Yagis for 144, 220 and 432 MHz designed by Steve Powlishen, K1FO. Dick Jansson, WD4FAB, has completely revised the space communications chapter, which includes his innovative helical array for AO-13 Mode L.

But that's not all. You'll find many other popular construction projects that can be built in a weekend, such as power supplies, keyers, measuring devices, QRP transmitters and VHF/UHF preamps. For the more ambitious builder, there are projects like a high-performance communications receiver, high-power HF and VHF amplifiers, a 1296-MHz transverter or digital audio memory keyer.

The **Handbook** has always been famous as a reference for component data. You will find an entire chapter devoted to everything from tube and transistor specifications to aluminum tubing sizes. Also featured is the most up-to-date information on digital techniques and operating practices.

At \$23, the **Handbook** remains an exceptional value for a hardcover technical publication. For shipping and handling in the US, please add \$3.50 (\$4.50 for UPS), elsewhere add \$5 for shipping by surface mail. Save on shipping charges by visiting your favorite ARRL dealer!

Here is a description of what is covered in the **Handbook**:

The first five introductory chapters cover: basics of Amateur Radio, electrical fundamentals, radio design technique and language, solid state fundamentals and vacuum tube principles. Next are 12 chapters devoted primarily to these topics: power supplies, audio and video, digital basics, modulation and demodulation, RF transmitters, receivers, transceivers, repeaters, power amplifiers, transmission lines and antenna fundamentals. Another four chapters cover voice, digital, image and special modulation techniques. The RF spectrum, propagation and space communications are covered in two chapters. The construction and maintenance section offers 12 chapters of useful projects ranging from power supplies and antennas through digital equipment. You'll also find up-to-date component data that the **Handbook** is famous for. The final five chapters cover obtaining your license, station design and operation, interference, monitoring and direction finding. An abbreviations list and huge index make up balance of the book.

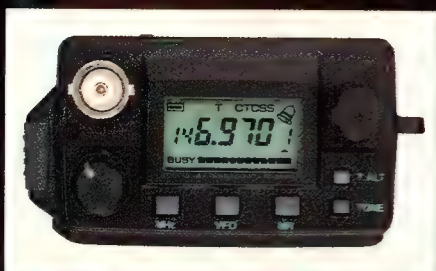
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TH-25AT/45AT

New Pocket Portable Transceivers

The all-new TH-25 Series of pocket transceivers is here! Wide-band frequency coverage, LCD display, 5 watt option, plus...

- Frequency coverage: **TH-25AT:** 141-163 MHz (Rx); 144-148 MHz (Tx). (Modifiable for MARS/CAP. Permits required.)
TH-45AT: 438-450 MHz.
- Automatic Power Control (APC) circuit for reliable RF output and final protection.
- 14 memories; two for **any** "odd split" (5 kHz steps).
- Automatic offset selection (TH-25AT).
- 5 Watts from 12 VDC or PB-8 battery pack.
- Large multi-function LCD display.
- Rotary dial selects memory, frequency, CTCSS and scan direction.
- T-ALERT for quiet monitoring. Tone Alert beeps when squelch is opened.
- Band scan and memory scan.
- Automatic "power off" circuit.
- Water resistant.
- CTCSS encoder / decoder optional (TSU-6).
- **Supplied accessories:** StubbyDuk, PB-6 battery pack for 2.5 watts output, wall charger, belt hook, wrist strap, water resistant dust caps.



Optional accessories:

- PB-5 7.2 V, 200 mAh NiCd pack for 2.5 W output • PB-6 7.2 V, 600 mAh NiCd pack • PB-7 7.2 V, 1100 mAh NiCd pack
- PB-8 12 V, 600 mAh NiCd for 5 W output • PB-9 7.2 V, 600 mAh NiCd with built-in charger • BC-10 Compact charger
- BC-11 Rapid charger • BT-6 AAA battery case • DC-1/PB-2V DC adapter • HMC-2 Headset with VOX and PTT • SC-14, 15, 16 Soft cases • SMC-30/31 Speaker mics • TSU-6 CTCSS decode unit • WR-1 Water resistant bag

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WHAT'S NEW ON THE ARRL BOOKSHELF?

The 1990 Handbook and Tune in the World with Ham Radio

The new editions you've been waiting for. You'll find more information about them elsewhere in this issue.

Conference Proceedings: 8th Computer Networking and Microwave Update, 1989

Here are two conferences that are on the cutting edge of Amateur Radio technology. *The 8th Computer Networking Conference Proceedings* (#2510) has papers submitted for the conference held October 7, 1989 in Colorado Springs, and *Microwave Update, 1989* (#2529) has papers submitted for the conference held on the same weekend in Arlington, Texas. Other recent conference proceedings booklets available are *Proceedings of the ARRL National Education Workshop* (2405) and *Proceedings of the 23rd Central States VHF Conference* (#2413). Price of each conference proceeding booklet is \$12 plus postage and handling.

N6RJ Second Op and N6RJ Second Op Software

Here in one place is all of the DX information you need about a particular country: Prefix, Continent, CQ Zone, Beam Heading, Postage Rates, ITU prefix. The software version (requires IBM PC, 640K installed memory, 2 DSDD 5-1/4" floppy disk drives or 1 DSDD 5-1/4" floppy disk drive and hard disk highly recommended) is packed with applications: comprehensive country data, bearings (long and short path) logging system, summary displays of DXCC/WAZ, extensive printing functions (like DXCC need-list by band, band-mode, worked-not confirmed etc), GMT clock with WWV propagation forecast timer, *N6RJ Second Op* (#243X) \$9; *N6RJ Second Op Software* vers. 2.0 (#2421) \$60 plus postage and handling.

What's going on between our HF ham-bands?

The 1990 edition of *Passport to Worldband Radio* (#2537, \$15 plus postage and handling) is hot off the press. In it you will find listings of shortwave broadcasts from over 150 countries. *Ferrell's Confidential Frequency List* (#2206, \$20 plus postage and handling) has over 370 pages listing, HF, CW, Coast, Fixed, Embassy, Military, FAX, Aircraft and Aircraft Weather, plus Time transmissions.

The FCC Rule Book

Here are the new rules with important interpretations in the style that has made the "Washington Mailbox" column in *QST* so popular. Find out what you can and cannot do under the new regulations. These are the most sweeping changes in the Amateur Radio rules in decades, so you'll need to have a copy close at hand. 8th Edition (#0453) \$9 plus postage and handling.

The Technician Class License Manual

On November 1, 1989 the new element 3A—Technician Class exam becomes effective. We've written this book around the new question pool to provide an understanding of key concepts and to make passing the exam a snap! At the beginning of each chapter, you will find a list of key words that appear there, along with a simple definition for each word or phrase, and as you read the text you'll find these words printed in **bold type** the first time they appear. At the end of the book you'll find the complete question pool with distractor questions, answer key (with page references showing where you can check the text for a quick review) and there's also a glossary of all the key words used in the book. (#2375) \$6 plus postage and handling.

The General Class License Manual

There won't be a change in the General Class exam until November 1, 1990, but we've taken this opportunity to break out the element 3B material from the *Technician/General Class License Manual* and put it in a separate book. The description above of the *Technician Class License Manual* also fits the new *General Class License Manual*. (#2383) \$6 plus postage and handling.

Amount of order/shipping and handling: less than \$20/\$2.50, \$20.01-30.00/\$3.50, \$30.01-40.00/\$4.50, \$40.01-50.00/\$5.50, \$50.01-75.00/\$6.50, Over \$75/\$7.50. Add an additional \$1 for UPS.

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tri-bander!

Warp Drive!

TS-790A Satellite Transceiver

The new Kenwood TS-790A VHF/UHF all-mode tri-band transceiver is designed for the VHF/UHF and satellite "power user." The new TS-790A is an all-mode 144/450/1200 MHz transceiver with many special enhancements such as automatic uplink/downlink tracking. Other features include dual receive, automatic mode selection, automatic repeater offset selection for FM repeater use, VFO or quick step channel tuning, direct keyboard frequency entry, 59 memory channels (10 channels for separate receive and transmit frequency storage), multiple scanning and multiple scan stop modes. The Automatic Lock Tuning (ALT) on 1200 MHz eliminates frequency drift. Power output is 45 watts on 144 MHz, 40 watts on 450 MHz, and 10 watts on 1200 MHz. (The 1200 MHz section is an optional module.)

- **High stability VFO.** The dual digital VFOs feature rock-stable TCXO (temperature compensated crystal oscillator) circuitry, with frequency stability of ± 3 ppm.

- **Operates on 13.8 VDC.** Perfect for mountain-top DXpeditions!

- **The mode switches confirm USB, LSB, CW, or FM selection with Morse Code.**

- **Dual Watch allows reception of two bands at the same time.**

- **Automatic mode and automatic repeater offset selection.**

- **Direct keyboard frequency entry.**

- **59 multi-function memory channels.** Store frequency, mode, tone information, offset, and quick step function. Ten memory channels for "odd split"

- **CTCSS encoder built-in.** Optional TSU-5 enables sub-tone decode.

- **Memory scroll function.** This feature allows you to check memory contents without changing the VFO frequency.

- **Multiple scanning functions.** Memory channel lock-out is also provided.

- **ALT—Automatic Lock Tuning—on 1200 MHz eliminates drift!**

- **500 Hz CW filter built-in.**

- **Packet radio connector.**

- **Interference reduction controls:** 10 dB RF attenuator on 2m, noise blanker, IF shift, selectable AGC, all mode squelch.

- **Other useful controls:** RF power output control, speech processor, dual muting, frequency lock switch, RIT.

- **Voice synthesizer option.**

- **Computer control option.**

Optional Accessories:

- **PS-31** Power supply • **SP-31** External speaker
- **UT-10** 1200 MHz module • **VS-2** Voice synthesizer unit
- **TSU-5** Programmable CTCSS decoder
- **IF-232C** Computer interface • **MC-60A/MC-80/**
- **MC-85** Desk mics • **HS-5/HS-6** Headphones
- **MC-43S** Hand mic • **PG-2S** Extra DC cable

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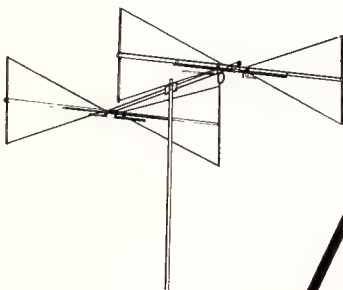
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- Add-on kit for 17 and 12 meters available now.
- 26 ft. tall

Model HF2V

- Designed for the low-band DXer
- Automatic bandswitching on 80 and 40 meters
- Add-on units for 160 and 30 or 20 meters
- 32 feet tall - may be top loaded for additional bandwidth

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TH-315A
Full-featured HT

full-featured HT covering 220–225 MHz. Ten memory channels and 2.5 watts of power. (5 W with PB-1 or 12 V DC.) Uses the same accessories as the TH-215A for 2 meters or TH-415A 440 MHz. For truly "pocket portability," choose the TH-31BT, a thumb-wheel programmable, 1 watt unit. For mobile use, select the TM-321A or TM-3530A.

The TM-321A is the 25 W, 220 MHz, 14-memory version of the super popular, super compact TM-221A. The 25-watt TM-3530A has 23 memories, a 15 telephone number memory and auto dialer. Direct keyboard frequency entry and front panel DTMF pad enhances operating convenience. Novice to Amateur Extra, these transceivers will put everyone on the air "Kenwood Style!"

TM-321A
Compact mobile transceiver

TH-31BT/31A
Pocket-held HT

New



New

TM-3530A
Full-featured mobile transceiver



The TM-321A comes with 16-key DTMF mic.
A complete line of accessories is available for all models.

Complete service manuals are available for all Kenwood transceivers and most accessories.
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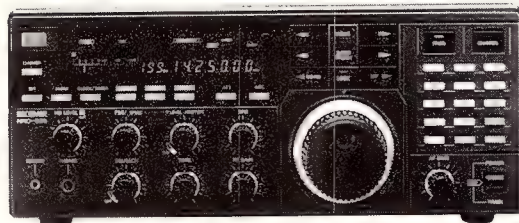
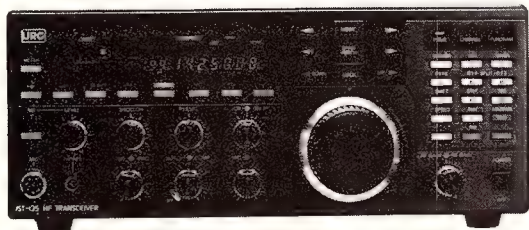
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JST-135

JRC HF GENERAL COVERAGE
COMMUNICATIONS RECEIVER

NRD-525



- General-Coverage Receiver
- Electronic Tuning ● Heavy-Duty Design
- Transceive Operation with the NRD-525 Receiver

Receiving frequency range 100kHz - 30MHz
Type of emission SSB(LSB/USB), CW, AME, FM, AFSK
Frequency stability Within ± 10 ppm 5 to 60 min. and within ± 2 ppm one hour after powered on

Power Output 150W
Dimensions 330W x 130(142)H x 280(391)Dmm
Weight Approx. 8.5kg

Receiving frequency range 0.09 - 34MHz
34 - 60MHz (*)
114 - 174MHz (*)
423 - 456MHz (*)
Receiving mode RTTY, CW, SSB(USB/LSB), AM, FM, FAX
Channel memory 200 channels

NOTES
Dimensions 330(W) x 130(H) x 280(D) (excluding projected parts)
Weight Approx. 8.5kg



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• Full power operation.

• Uses "ISO-RES" inductors.

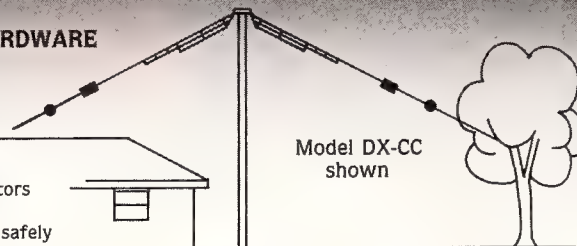
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(Smaller 14 ga. wire not used in any Alpha Delta antenna)

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Model DX-CC shown

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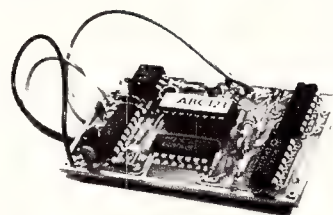
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The low-pass design of the AT-300 is what you would expect from a company where Engineering Makes the Difference. The low-pass design of this AEA tuner means harmonic attenuation for lower TVI potential. This design also allows matching a much wider range of antenna impedances than the common high-pass designs.

Larger Size

One look at the AT-300 lets you know this tuner is different, it's bigger. While some manufacturers promote the small size of their tuners, AEA knows that performance is most important. The simple reason for the larger size is that smaller sizes degrade the inductors' Q (Quality factor), which results in less efficiency. Less efficiency means that for a given power output from your transmitter, less power will actually get to your antenna.

Easy Operation

The AT-300 tuner features a precision frequency compensated dual-movement SWR meter for ease of tuning. The high and low power front panel switch selects the proper range for the SWR meter. The AT-300 is rated for 300 watt operation. The internal balun and front panel selector switch allows for balanced and unbalanced outputs.

Get maximum performance from your transceiver and antenna by using the AT-300 antenna tuner from AEA. See your local AEA dealer today or contact:

Advanced Electronic Applications, Inc.

P.O. Box C-2160
Lynnwood, WA 98036
206-775-7373

AEA Retail \$249.95

Amateur Net \$219.95

ONE GARANT ANTENNA TO WORK ALL 9 HF BANDS

The GARANT WINDOM ANTENNAS GD-3 to GD-9 don't need a matchbox, if they are properly installed, as the SWR on all bands is very low - 1.5:1 or less. The GD-WINDOM is a modified windom (50Ω coax feedline) which uses a special proper-ratio balun. No, it isn't a 1:4. Those don't work. Our GD-BALUN matches the low-impedance (50Ω) coax feedline to the high-impedance windom antenna design. GD-WINDOMS may be installed as straight horizontal dipoles, inverted-Vs, or L-shaped dipoles. GARANT GD-WINDOM ANTENNAS are available for 500W PEP or 2KW PEP. ALL GARANT GD-WINDOMS ARE SOLD WITH A 10-DAY MONEY-BACK GUARANTEE AND A 3-YEAR LIMITED WARRANTY. Who else has that much confidence in his merchandise?



GD-9: 160-80-40-30-20-17-15-12-10M. max. length 255ft
 GD-8: 80-40-30-20-17-15-12-10M BANDS, max. length 137ft
 GD-6: 80-40-20-17-12-10M BANDS, max. length 137ft
 GD-5: 40-30-20-15-10M BANDS, max. length 67ft

NOTE: The GD-8 and GD-9 work all new WARC bands.



Write or phone for our free data report on all our GARANT GD-WINDOM ANTENNAS with technical data, actual SWR curves, scores of customer comments from the USA and Canada, and our low factory-direct prices. VISA and MASTERCARD phone orders accepted.

The owner of GARANT ENTERPRISES sells ham radio gear for 26 years. We are at our present location for eight years. FAX orders/inquiries DIAL 1-807-767-0888.

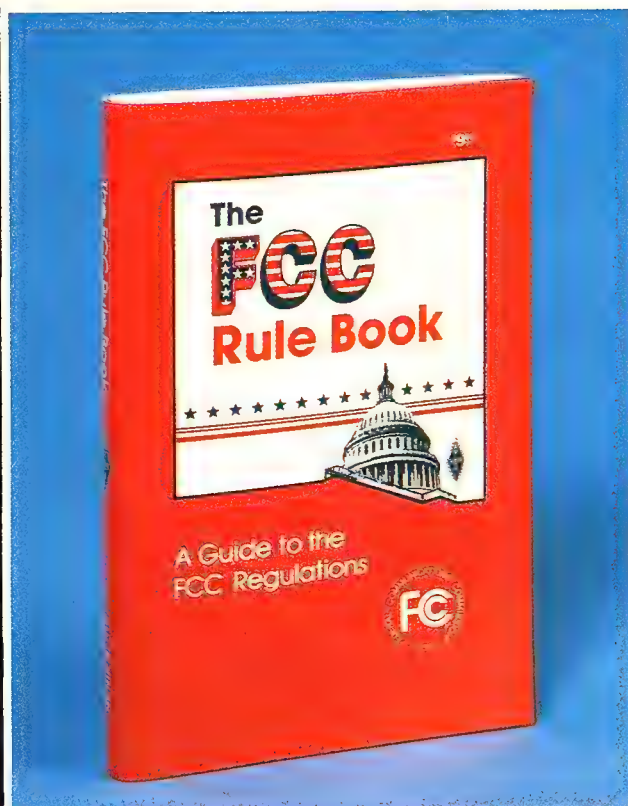
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YES, THEY REALLY DO WORK! READ WHAT OUR CUSTOMERS WRITE:

W0HBE, John on his GD-8/500W: "I was impressed by the low SWR on all bands and comparison tests have proved to me that the GARANT GD-8 windom is far superior to any other wire antenna." **W8YFK**, Fred, "I purchased one of your GD-9/2KW antennas about 6 months ago. It works great - nine bands, no external tuner. Who could ask for anything more?" **K16QE**, in California, "I have been using your GD-6/2KW antenna now for over 6 months. I am the net control station for the AMSAT West Coast 75m net and I need good coverage up and down the West Coast from Canada to Southern California. I also need coverage on 40, 30, 17 and 12 meters without having to put up multiple wires. The GD-6 has filled all these requirements adequately. On the 75 meter net I have reports of outstanding signals." **IK6JJN**, Raffaele writes, "I am using the GARANT GD-6/500W two years now, and it is doing a wonderful job for me. I am very grateful to Garant Enterprises for the high quality products, reasonable price and fast service." **WA2YKB**, Ken works his GD-8/500W from an apartment, "The antenna works fine even though it's only 2½ft above the roof. ... As the balun is fairly small, so the antenna is hard to see from the ground." **W5DKA**, Clovis writes, "I am well satisfied with my GARANT GD-6/2KW windom dipole - working 75 through 10 meter phone bands. Low SWR - good reports. Worked England on 10 meters. (NO ANTENNA TUNER). Also Uva Island, Panama - GOOD ANTENNA." **K0MAH**, Fritz on his GD-9/2KW, "It works great. Work lots of CW on all bands - including DX. ... Today I made several DX - Europe - contacts in a few minutes on 21MHz SSB." **KA3SDO**, John on his GD-8/500W, "Prompt delivery, helpful phone ordering and information, combined with A QUALITY PRODUCT. GARANT truly has an unbeatable combination." **W9JLZ**, Charles, "GARANT GD-8/500W antenna performs very well on all bands with Kenwood TS440. ... Gave me gain in Tampa, FL. on 40 meters over a dipole. Service was excellent. GREAT ANTENNA. Get great signal reports." **N8ENO**, George writes, "GARANT renders great service and speedy shipping. I ordered my GD-8/500W by telephone and used VISA. The antenna performs really good on all bands. ... Could not put it up full length or proper inverted-V. Had to install it as a lazy-V. FB antenna." **N8BED**, Michael, "Order received promptly as promised. GD-8/500W antenna works as promised, using your measurements. No trimming required." **NØIGE**, Don writes, "I am very pleased with the shipping speed, service and the GD-8/500W antenna. This is my only antenna for 10 to 80 meters. What a great performing antenna. I sure get a lot of compliments on my signal. I am very pleased. Thanks." All original letters are on file for your inspection.



Team efforts: Here's the new 288-page *FCC Rule Book*, the culmination of work done by the ARRL Board's Part 97 committee and a team of editors headed by Rick Palm, K1CE. Other new editions along the licensing front are *Tune in the World with Ham Radio* and separate *Technician* and *General Class License Manuals*.

Tune in the World with Ham Radio New edition for exams given on or after Nov. 1, 1989:

Kit with Book and Cassettes	#2472 \$19
Book only	#2464 \$14
Technician Class License Manual New edition for exams given on or after Nov. 1, 1989	#2375 \$ 6
General Class License Manual	#2383 \$ 6
Advanced Class License Manual	#016X \$ 5
Extra Class License Manual	#2391 \$ 8
FCC Rule Book New Rules!	#2456 \$ 9

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Code Practice Cassettes Each set of two C-90 tapes gives 3 hours of instruction

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See the ARRL Bookshelf page elsewhere in this issue for ordering information.

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INTRODUCING AEA's NEW ANTENNAS

The superior engineering designs, quality and high performance that AEA built its reputation on are now available in its dynamic new line of antennas. Developed and manufactured by Mike Staal K6MYC, president of M² Enterprises and co-founder of KLM antennas, the product line includes an assortment of 2-meter, 6-meter and 440 MHz antennas and accessories for fixed or portable applications. AEA/M² antennas are already recognized for their superior performance by many moon-bouncers.

Features. AEA's new antenna line features computer-optimized antennas with the highest gain for boom-length attainable.

Other features include:

- Machined aluminum driven element housing with built-in "N" connector and O-ring seals including access cover
- Silicone dielectric gel in the cavities to withstand inclement weather
- Parasitic elements insulated through the boom on most units for long-term performance and reliability
- Electronically tuned balun combined with unique driven element design to produce symmetrical patterns
- Swaged and tapered boom plus solid rod elements to reduce windload
- Low windload overhead dacron boom support
- Flexible boom-to-mast mounting for mechanical balance
- Ideal for multiple antenna arrays.

Accessories. To compliment the antenna line, AEA also offers various "H" frame support packages. The MT-3000 heavy-duty elevation mechanism and controller for tilting up multiple yagi arrays. Also welded aluminum power dividers for coupling multiple antennas.

For further information, see your local AEA authorized dealer, or call AEA at (206)775-7373.

meter and 2-meter moonbounce installation. Four 6M-2WL, four 6M-5WL and one 432-13WL antennas in array on self-supporting 89-foot US tower at N7ML.

2M-18XXX installation at N7KQK.

Model	6M-5	6M-2WL	6M-2.5WL	2M-5WL	2M-18XXX	2M-6WLHD	2M-CP14	2M-CP22	EB-144	430-16	432-13WL	EB-432
Elements	5	9	11	17	18	20	14	22	N/A	16	39	N/A
Boom	15'9"	39'6"	50'4"	33'	36'	41'4"	9'10"	18'	N/A	10'	30'3"	N/A
Weight	11/14	31/40	38/47	13/15	14/16	30/37	6/8	12.5/15	1.5/3	4/5	12/13	1.3/3
Windload	2.0	5.0	5.9	2.7	2.9	6.1	1.1	2.5	N/A	0.82	2.5	N/A

boom - Length, feet and inches.
 weight - Weight in pounds, antenna weight/shipping weight.
 windload - Windload area in square feet.
 - Six meters. 2M - Two meters. WL - Wavelength.
 - Heavy-duty. CP - Circularly polarized. EB - Eggbeater.

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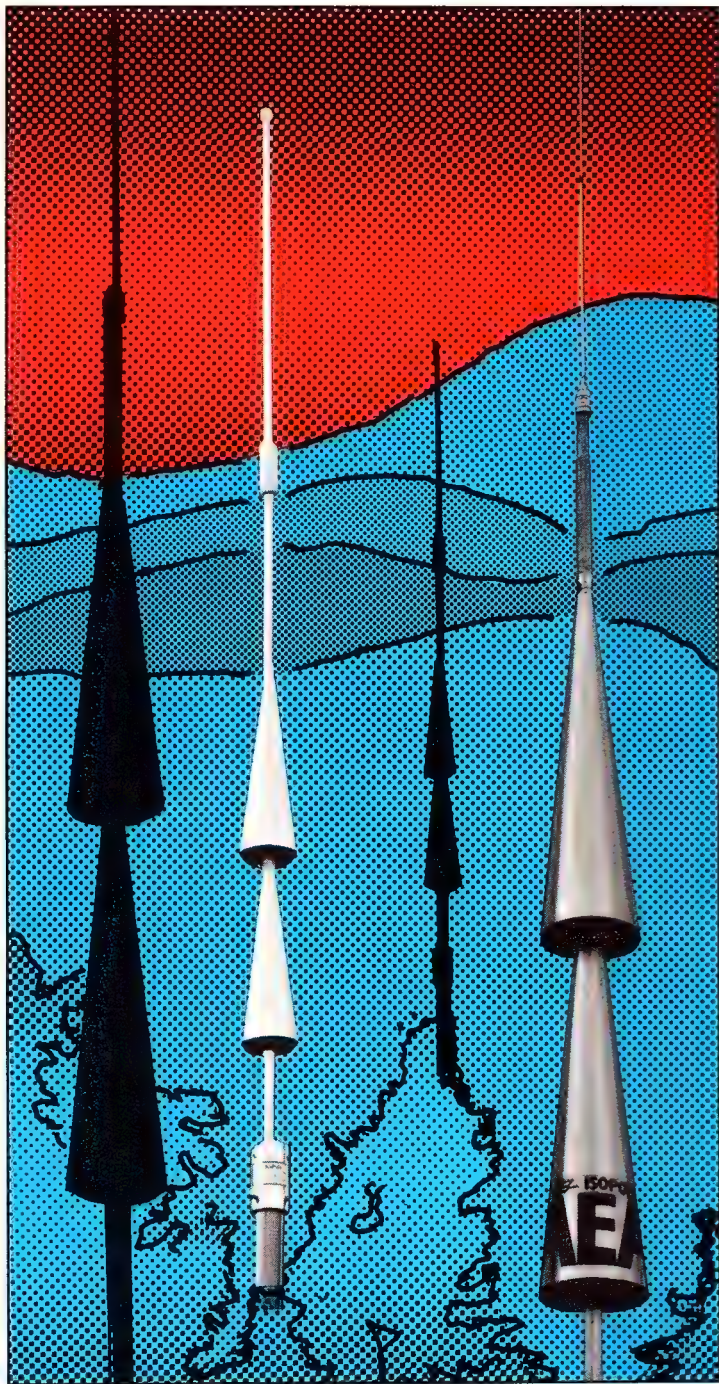
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Improve Your Performance



The only logical choice for a cost and space efficient base station antenna is AEA's IsoPole.™ And for improved performance with your handheld, the AEA Hot Rod™ antenna.

IsoPoles.™ Available in 144, 220 or 440 MHz, all IsoPole™ antennas yield the maximum gain attainable for their respective lengths, and a zero degree angle of radiation. Exceptional decoupling results in simple tuning and a significant reduction in TVI potential. Cones offer greater efficiency over obsolete radials which radiate in the horizontal plane. Plus the IsoPoles™ have a broad frequency coverage. This means no loss of power output from one end of the band to the other, when used with SWR-protected solid-state transceivers. Experience a typical SWR of 1.4 to 1 or better across the entire band!

VHF versions include a 50 ohm SO-239 connector recessed within the base sleeve for full weather protection. With the IsoPole™ you won't experience the aggravating deviation in SWR when the weather changes. Also, the impedance matching network is designed for maximum legal power and compensates for the impedance lump introduced by the SO-239 connector used in the VHF models.

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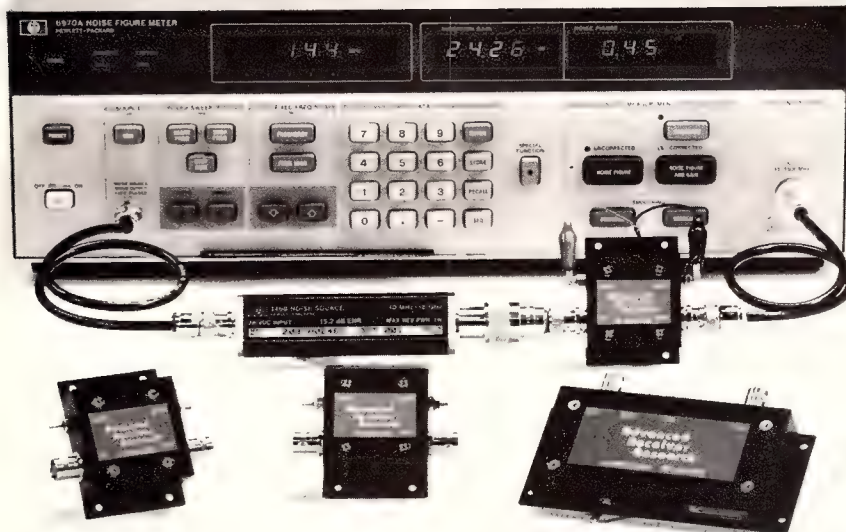
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P50VD	50-54	<1.3	15	0	DGFET	\$29.95
P50VDG	50-54	<0.5	24	+12	GaAsFET	\$79.95
P144VD	144-148	<1.5	15	0	DGFET	\$29.95
P144VDA	144-148	<1.0	15	0	DGFET	\$37.95
P144VDG	144-148	<0.5	24	+12	GaAsFET	\$79.95
P220VD	220-225	<1.8	15	0	DGFET	\$29.95
P220VDA	220-225	<1.2	15	0	DGFET	\$37.95
P220VDG	220-225	<0.5	20	+12	GaAsFET	\$79.95
P432VD	420-450	<1.8	15	-20	Bipolar	\$32.95
P432VDA	420-450	<1.1	17	-20	Bipolar	\$49.95
P432VDG	420-450	<0.5	16	+12	GaAsFET	\$79.95

Inline (rf switched)						
SP28VD	28-30	<1.2	15	0	DGFET	\$59.95
SP50VD	50-54	<1.4	15	0	DGFET	\$59.95
SP50VDG	50-54	<0.55	24	+12	GaAsFET	\$109.95
SP144VD	144-148	<1.6	15	0	DGFET	\$59.95
SP144VDA	144-148	<1.1	15	0	DGFET	\$67.95
SP144VDG	144-148	<0.55	24	+12	GaAsFET	\$109.95
SP220VD	220-225	<1.9	15	0	DGFET	\$59.95
SP220VDA	220-225	<1.3	15	0	DGFET	\$67.95
SP220VDG	220-225	<0.55	20	+12	GaAsFET	\$109.95
SP432VD	420-450	<1.9	15	-20	Bipolar	\$62.95
SP432VDA	420-450	<1.2	17	-20	Bipolar	\$79.95
SP432VDG	420-450	<0.55	16	+12	GaAsFET	\$109.95

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(4) Closing date for Ham-Ads is the 13th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received November 14th through December 13th will appear in February QST. If the 13th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawing, games of chance, etc. is not permitted in QST advertising.

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The League reserves the right to decline or discontinue advertising for any reason.

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IMRA—International Mission Radio Association helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1:00-3:00 PM Eastern Time. Rev. Thomas Sable, S.J., University of Scranton, Scranton, PA 18510.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleuler, Jr, Secretary, 46 Murdock Street, Fords, NJ 08863.

FCC EXAMS. Novice-Extra Class, Walk-in's only. Sunnyvale VEC ARC, POB 60142, Sunnyvale, CA 94088-0142, 408-255-9000, 24/hr. Gordon, W6NLG, President. Flea Market, March-Sept, Foothill College, Los Altos Hills, CA.

MARCO: Medical Amateur Radio Council, operates daily and Sunday nets. Medically-oriented amateurs (physicians, dentists, veterinarians, nurses, therapists, etc.) invited to join. For information, write MARCO, Box 73's, Acme, PA 15610.

JOIN The Old Old Timers Club, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C., 1409 Cooper Drive, Irving, TX 75061.

LITTLE Big Horn Nets Sundays: 14.057-2200Z, 21.150-2230Z. Native American Indians and Others Welcome. Info WA2DAC.

SCARA Indoor Ham Radio and Computer Flea Market. Sunday, November 12, 1989 at the North Haven Park and Recreation Center, 7 Linsley Street, North Haven, CT. Sellers admitted at 7 AM. Buyers from 9 AM to 3 PM. Tables are \$12 in advance, \$15 at the door. General admission \$3 per person. Talk-in on 146.01/61. Reservations for tables must be received with check by November 2, 1989, and no reservations by phone. For information or reservations, SASE to: SCARA Flea Market, PO Box 81, North Haven, CT 06473 or call between 7 PM and 10 PM Brad at 203-265-6478.

INTERESTED In Public Service? Join your Local Radio Emergency Associated Communications Team. In Pennsylvania call 717-838-6943 or write REACT, 1160 Old Trail Road, Etners, PA 17319.

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The Morse Machine

The Ultimate Keyer from AEA



The Morse Machine has all the features you've been asking for in a high performance keyer like 2-99 WPM speed selection and over 8,000 characters of memory that can be stored in 20 memories. The 20 memories are soft partitioned so that your stored messages may be as short or long as you like. Memory can be expanded to hold up to 36,000 characters. Of course, all memory is backed up by an internal lithium battery so that once a message is loaded, it will stay there until you write over it.

Whether you're an expert or a novice, The Morse Machine has three ways to help you improve your code:

- A proficiency trainer, the same as the one used in the MorseMatic, allows random code group practice with steadily increasing speed.
- A random word generator that randomly generates 4-letter words for a more realistic practice session.
- Dr. QSO (tm) QSO simulator based on our program for the Commodore 64 computer. You can call other stations, answer a CQ, or just sit back and listen to realistic QSOs very much like those you would hear on-the-air.

The Morse Machine is a full featured keyer for the serious contester, with automatic serial

number insertion and incrementing in any memory message. You can use the front panel knob to adjust your sending speed or enter a precise speed with the keypad, toggling between the two at any time. Exchanges can be speeded up by having parts of your message sent at a higher speed. You can also add remote switches for 4 of the memories so that you can instantly send your responses or call CQ.

A computer can be interfaced to The Morse Machine through its RS-232 compatible I/O. Any front panel function may be programmed by the computer. This makes loading memories as simple as typing them in from your keyboard. The Morse Machine can display your random code, or Dr. QSO practice sessions on the computer screen.

The Morse Machine can be programmed to be an automatic beacon. This can be used to automatically repeat a Morse (or RS-232 ASCII) message at a programmed interval of 1 to 999 seconds.

See your AEA dealer today for a demonstration of The Morse Machine or contact:

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HI-Q BALUN

- For dipoles, yagis, inverted vees and doublets
- Replaces center insulator
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- Broadbanded 3-40 MHz.
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- 1:1 Impedance ratio
- For full legal power and more
- Helps eliminate TV!
- With SO 239 connector
- Built-in DC ground helps protect against lightning

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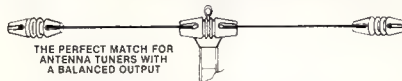
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THE ALL-BANDER DIPOLE



- Completely factory assembled ready to use
- Heavy 14 (7/22) gauge stranded copper antenna wire to survive those severe storms
- Center fed with 100 feet of low loss PVC covered 450 ohm balanced transmission line
- Includes center insulator with an eye hook for center support
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- Complete installation instructions included
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- Handles 2 kw PEP & covers 160 through 10 meters
- May be trimmed to fit small city lots

Only \$29.95

DIPOLAS

MODEL	BANDS	LENGTH	PRICE
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D-80	80/75	130'	\$31.95
D-40	40/15	66'	28.95
D-20	20	33'	27.95
D-15	15	22'	26.95
D-10	10	16'	25.95
Shortened dipoles			
SD-80	80/75	90'	35.95
SD-40	40	45'	33.95
Parallel dipoles			
PD-8010	80,40,20,10/15	130'	43.95
PD-4010	40,20,10/15	66'	37.95
PD-8040	80,40/15	130'	39.95
PD-4020	40,20/15	66'	39.95
Dipole shorteners	— only, same as included in SD models		
S-80	80/75		\$13.95/pr
S-40	40		12.95/pr

All antennas are complete with a HI-Q Balun, No. 14 antenna wire, insulators, 100' nylon antenna support rope (SD models only 50'), rated for full legal power. Antennas may be used as an inverted V, and may also be used by MARS or SWLs.

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Nylon guy rope, 450 lb. test, 100 feet \$4.49
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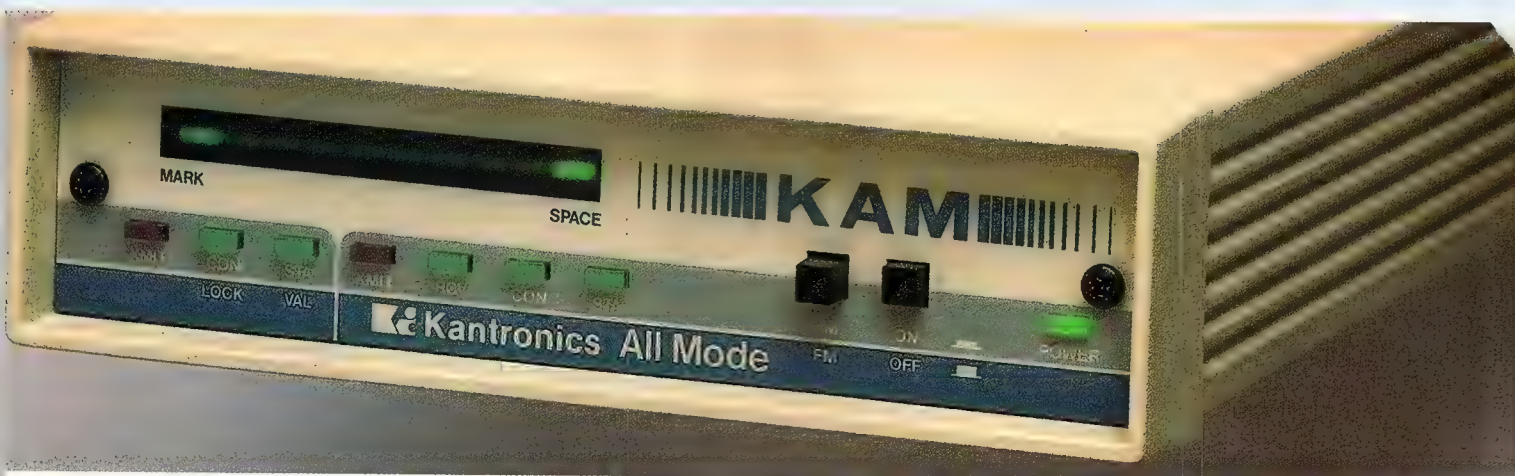
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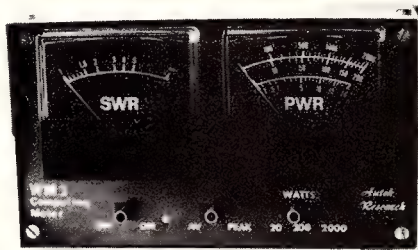
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WANTED: Pre-1930 QSTs. Richard Titus, NV2C, 231-9 Lucas Lane, Voorhees, NJ 08043, 609-772-0316.

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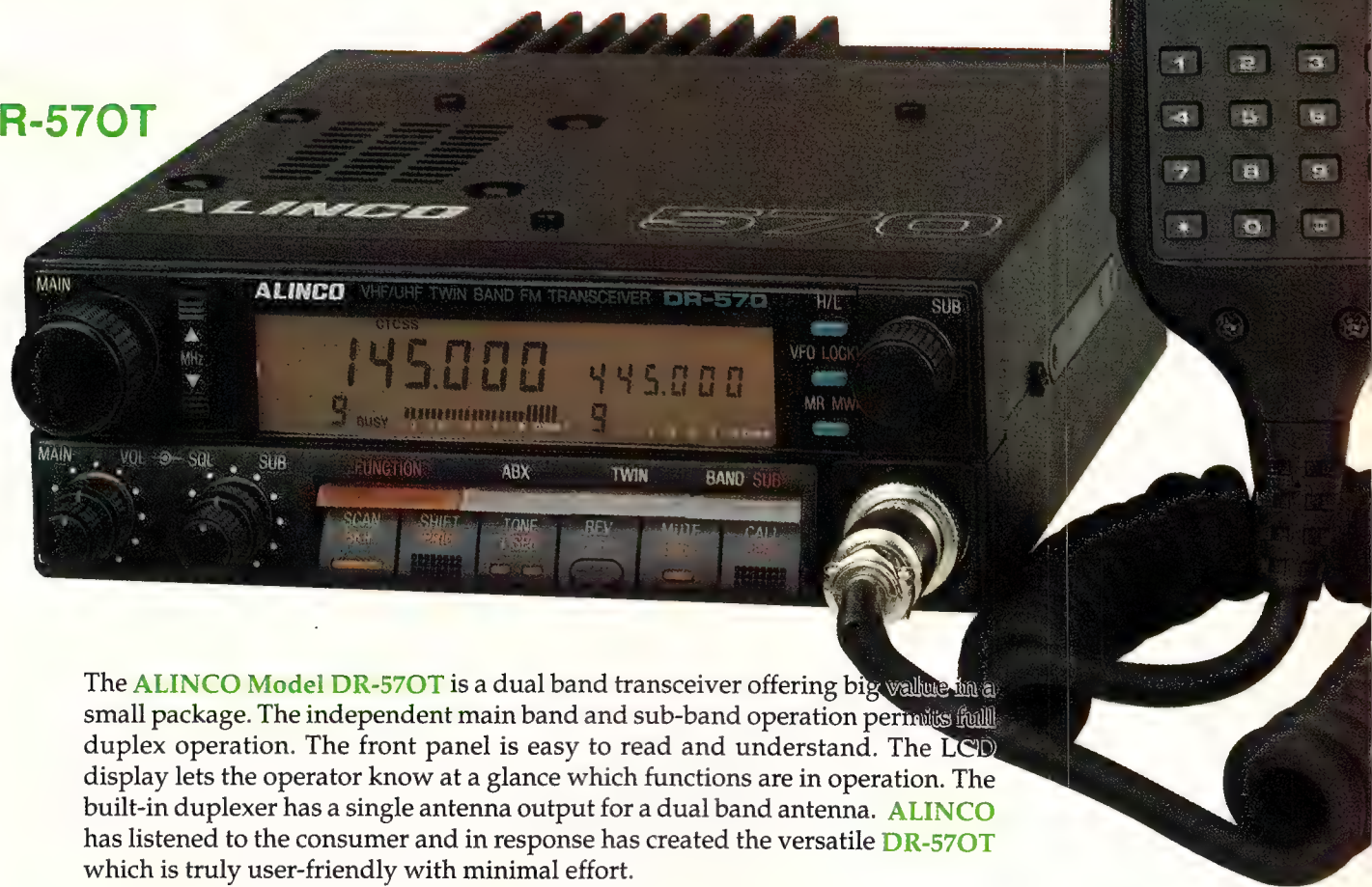
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BOOK WANTED: History Of Wireless Telegraphy by J. J. Fahie reprinted Arno Press 1971. Write John Taylor, G8AKN, 89 Lion Road, Twickenham TW1 4HT ENGLAND with price and phone number.

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DR-570T



The **ALINCO Model DR-570T** is a dual band transceiver offering big value in a small package. The independent main band and sub-band operation permits full duplex operation. The front panel is easy to read and understand. The LCD display lets the operator know at a glance which functions are in operation. The built-in duplexer has a single antenna output for a dual band antenna. **ALINCO** has listened to the consumer and in response has created the versatile **DR-570T** which is truly user-friendly with minimal effort.

• **ULTRA-COMPACT BODY** 5 7/8" (W) x 2" (H) x 8 1/2" (D)

• **HIGH POWER**

45 watts on 2M and 35 watts on 70 cm.
Approximately 5 watts low power.

• **EXTENDED RECEIVER RANGE**

(130-169.995 MHz) on 2M, 144-147.995 MHz transmit. 440-449.995 MHz on 70 cm. (transmit and receive)
(Specifications guaranteed on amateur bands only. Modifiable for MARS/CAP permits required)

• **SIMULTANEOUS**

Receiving on both bands at the same time
Scanning: intermix scan modes on both bands at the same time

• **INDEPENDENT**

The volume, squelch and control dial are independently adjustable on both bands. You can store the following information on both bands at the same time. Priority function, choice of 37 encoding/decoding sub-tone frequencies, call channel, scan function (program, memory channel, VFO or unique open channel scan), memory skip, bell function, + or - repeater shift.

FULL FEATURES

- **FULL DUPLEX CROSS BAND OPERATION**
Transmit on one band while receiving on the other band -- telephone style.

• **AUTOMATIC BAND EXCHANGE (A.B.X.)**

When in the ABX function is active, an incoming signal on the sub-band will activate an automatic exchange between the main band and the sub-band.

• **PRIORITY**

The VFO frequency is monitored for 5 seconds and then shifts for one second to the selected priority channel (In both bands at the same time).

• **DUAL SPLIT SHIFT OPERATION**

Operates odd offset operation

• **BELL FUNCTION**

• **REPEATER REVERSE FUNCTION**

• **CALL CHANNEL FUNCTION**

• **BEEP FUNCTION**

• **20 MEMORIES (10 FOR EACH BAND)**

Each memory channel can store frequency, repeater offset, encode/decode frequency.

• **4 SCANNING MODES**

Program scan, memory scan, band scan and unique open channel scan (opposite to normal busy scan). Scan stops on a busy (or open channel) channel and then resumes approximately 5 seconds after stopping even if the signal is still present.

• **REPEATER OPERATION**

The DR-570T can be used as a cross band repeater.

EASY TO OPERATE FUNCTION

• **LARGE AMBER MULTI-FUNCTION LCD DISPLAY**

Visible in all conditions, it indicates main and sub-band frequencies, frequency step, "on air", "call", "CTCSS", "PRI", "REV", "-", "+", "*", "T" (tone), tone frequency, "MUTE", "LOCK", "ABX", "BUSY", "F", "S/Rf meter", "REV"

• **MHz FUNCTION FOR BOTH BANDS**

One MHz is increased or decreased per touch

• **SELECTABLE DUAL AND SINGLE BAND OPERATIONS**

One touch selection with pressing of twin key

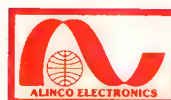
• **SELECTABLE BAND MODE (MAIN/SUB)**

One touch selection with pressing of band key

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MRF315A	32.50	2N6083	11.00	SC1027	use SAU4
MRF316	64.50	2N6084	12.75	SC1028	use SAV15
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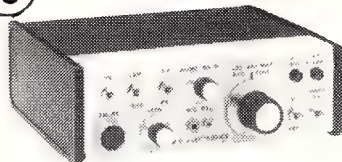
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(For more information, see QST Magazine, Oct. 1988, page 36)
 If you know how to solder, this problem is easily corrected by installing improved VHF parasitic-suppressors.

Suppressor Retrofit-Kits are available from the author of this article. All materials, MOP resistors, capacitors, instructions, diagrams and a 430°F silver-solder kit are supplied, nothing else to find. Retrofit-kit for a (1) or a (2) 3-500Z amplifier: standard duty-cycle, \$12, delivered; increased duty-cycle option, add \$2. Suppressor retrofit-kits are also available for HF-amplifiers that use 572B, 8122, 8873, 8874, 8875, 3CX800A7, 3-1000Z, 3CX1200A7, and 8877 tubes.

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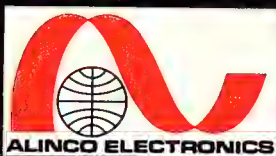
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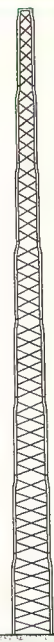
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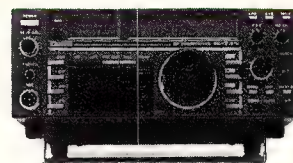
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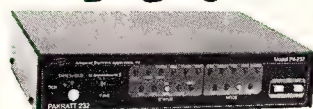
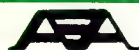
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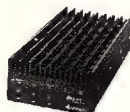
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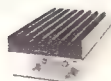
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The NEW OMNI V:

The OMNI V is a Paragon with a 12 band crystal mixed local oscillator in place of the general coverage synthesized oscillator. The result is receiver cleanliness like the legendary Corsair and Omni series. The OMNI V local oscillator is a new ultra low noise 5.0 to 5.5 MHz PLL design. Phase noise is simply eliminated as a significant variable. Dynamic range is maintained right up to the edges of the crystal filters, even under the most adverse conditions.

Many of the nifty features made possible by digital technology are included. Dual VFO's with A-B-split select, the frequency stability of a PLL, 25 tuneable memories, VFO to MEM, MEM to VFO and the SCRATCHPAD feature. RS-232 interface is standard and includes remote band switching for the HERCULES II amplifier. The memories are nonvolatile RAM and are retained until you change them. The status registers and clock are backed with a lithium battery (2 year life) so that when the rig is powered up, the status is the same as when you turned it off.

The OMNI V operates USB, LSB, fast or slow QSK CW and real FSK. FM is optional. All bands from 160 through 10 meters are push button selectable. Each band position covers 500 kHz plus 30 kHz over-shoot at the band edges. The four 500 kHz segments of the 10 meter band are switched automatically as you tune through the

**The OMNI V Station with
Model 961 Matching Power Supply,
and the Mighty Titan Amplifier.**

segment limits. Tuning is in your choice of 10 Hz or 50 Hz increments on SSB, CW and FSK. With the FM option, tuning is in 100 Hz or 500 Hz increments. Up/Down buttons tune in 10 kHz or 50 kHz increments.

An auxiliary frequency tuning system is available and plugs into the rear panel. This allows you to remotely tune the frequency from the most convenient and comfortable position. It takes about 10 ms to fall in love with this option.

A noise blander and audio speech processor are standard equipment as is the cw sidetone and speech monitor. The rear panel has a full complement of inputs, outputs and controls for the convenience of the all-mode operator, including an auxiliary RX antenna input. High speed key lines are provided for QSK control of a fast switching amplifier, such as the TITAN or HERCULES II. Changeover in fast QSK is less than 30 ms, great for CW and the digital modes.

The front panel is spacious and friendly. The vacuum fluorescent display uses large, bright, easy to read elements. The frequency display doubles as the 24 hour clock display when the CLOCK button is pressed. Other elements indicate VFO status and warn when the memories are full.

All four of the 6.3 MHz I-F crystal filter positions are push-button selectable, independent of mode. A second filter socket is also provided, in series, behind the standard 2.4 kHz filter in the 9 MHz I-F. This may be used for an optional 2.4 kHz, 1.8 kHz, 500 Hz or 250 Hz filter which is selected with the "NARROW" button. This adds six or eight poles into the crystal filter network and

even further reduces the impact of adjacent strong signals. Most impressive!

If you do not need a general coverage receiver in your HF rig, the elegant OMNI V is a great choice. If you are also a serious DX'er and/or contest, the OMNI V is the best choice.

GENERAL SPECIFICATIONS

Frequency Range: Transmit and receive on all ham bands from 160 through 10 meters in their entirety. Twelve 500 kHz segments plus 30 kHz over-shoot at the upper and lower edges of the segments.

Frequency Control: LO generated from a crystal oscillator mixed with a low noise 5.0 - 5.5 MHz phase locked loop.

Frequency Stability: Worst case, 1 PPM per degree C at 29.999 MHz.

Frequency Accuracy: ± 100 Hz @ 25 degrees C.

Antenna Impedance: 50 Ohms, unbalanced.

Printed Circuit Boards: G-10 epoxy glass.

Power Required: Receive = 1.5 A. Transmit = 20 A. 12-14 Vdc.

Dimensions: HWD $5\frac{3}{4}$ " x $14\frac{3}{4}$ " x 17". 14.6 x 27.3 x 43.2 cm.

Net Weight: 16 lbs. 7.25 kg.

TRANSMITTER

Modes: USB and LSB (J3E), CW (A1A), FSK (F1A). Optional FM (F3E).

DC Power Input: 200 watts maximum.

RF Power Output: ALC stabilized, adjustable from 20 watts to 100 watts (50 Ohm load) with front panel RF OUT control.

Microphone Impedance: 200 Ohms to 50k Ohms. Bias voltage for electret mic is provided in front panel connector.

CW Sidetone: Internally generated with rear panel level and tone adjustments, independent of front panel audio level control.

SSB Generation: 9 MHz, 8 pole crystal ladder filter, balanced modulator.

Carrier Suppression: Greater than 60 dB.





Impressive from either end... but it's how we make ends meet that really delivers the difference.

Unwanted Sideband Suppression: Greater than 60 dB at 1.5 kHz AF input.

Harmonic Emissions: Greater than 45 dB below peak power output.

Third Order Intermod Products: -30 dB from two tone at 100 watts PEP.

Metering: Switchable forward power, SWR, collector current or audio processing level on SSB.

CW Offset: 600 Hz.

FSK Shift: 170 Hz.

RECEIVER

Modes: LSB, USB, CW and FSK. FM with optional board.

Sensitivity: .15 μ V for 10 dB signal to noise ratio at 1.8 kHz bandwidth. With FM option, .3 μ V for 12 dB SINAD at 15 kHz bandwidth.

Selectivity:

	-6 dB BW	-60 dB	Shape Factor
Standard 2.4 kHz	2.4 kHz	3.36 kHz	1.87:1
Opt. 1.8 kHz	1.8 kHz	2.90 kHz	1.60:1
Opt. 500 Hz	500 Hz	1.40 kHz	2.80:1
Opt. 250 Hz	250 Hz	.85 kHz	3.40:1
Opt. FM	15 kHz	30.00 kHz	2.00:1

Attenuator: -20 dB.

I-F Frequencies: 1st I-F 9 MHz, passband tuning I-F 6.3 MHz.

Image Rejection: >100 dB.

I-F Rejection: >60 dB average.

Noise Blanker: Switchable on/off with width adjustment.

Dynamic Range: 97 dB, measured with standard 2.4 kHz filter at 20 kHz spacing. 100 dB + with cw filters.

Third Order Intercept: +10 dBm.

Noise Floor: -133 dBm @ 2.4 kHz bandwidth.

Squelch Sensitivity: Less than .6 μ V.

Receiver Recovery Time: Less than 30 ms.

Pass Band Tuning I-F Shift: + -2.3 kHz.

Audio Output: Speaker, 1.5 watts @ 8 Ohms.

Fixed level 1 mw @ 600 Ohms.

Notch Filter: 250 Hz to 2.2 kHz, greater than 50 dB notch depth.

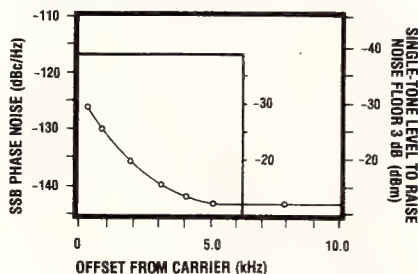
Audio Bandpass Filter: 4 pole, variable center frequency 220 Hz to 1.7 kHz, 35% band width @ -6 dB.

Tone Control: Variable 15 dB roll-off @ 5 kHz.

PHASE NOISE PERFORMANCE OF THE OMNI V

-127 dBc/Hz @ 250 Hz offset from carrier.

-146 dBc/Hz @ 5 kHz offset from carrier.



Here is a graph of the phase noise performance of the OMNI V receiver. These measurements can only be made under laboratory conditions and, even then, our test equipment is at the limit of its ability to measure the noise at the narrow offsets. The significant measurements are those close-in. Note that this graph does not even go out to 25 kHz offset where many of the published measurements are made. Certainly, we invite comparison.

A WORD ABOUT COST

The OMNI V and the Paragon are the same price. Our 12 band crystal mixed oscillator is the same cost to manufacture as our general coverage synthesized oscillator. The choice between these two transceivers is based on general coverage vs. the best possible receiver performance in the ham bands.

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Probably designed for child's toy. Lever selects 2 forward and one reverse speed. 1st gear approx. 120 rpm/6vdc, 2nd gear approx. 300 rpm/6vdc, Reverse approx. 120 rpm/6vdc.
3.35" X 1.75" X 3.25"
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Recharges up to four AA, C, D or two 9 volt nickel cadmium rechargeable batteries.
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SOLAR CELL
4 inch square silicon solar cell. Produces 0.30-0.45 volts @ 1500 mW/m² direct sunlight. Solder together in series or parallel for higher voltage or amperage. Ideal for use in solar panels, battery chargers and solar energy products.
CAT# SCEL \$3.50 each
25 for \$75.00

WALL TRANSFORMERS
ALL PLUG DIRECTLY INTO 120 VAC OUTLET
6 Vdc @ 500 ma. CAT# DCT-600 \$2.25
9 Vdc @ 500 ma. CAT# DCT-900 \$2.50
12 Vdc @ 500 ma. CAT# ACTX-1200 \$3.50
15 Vdc @ 1 amp. CAT# ACTX-1500 \$3.50

LED'S
STANDARD JUMBO DIFFUSED T-1 3/4 size
RED CAT# LED-1 10 for \$1.50 - 100 for \$17.00
GREEN CAT# LED-2 10 for \$1.50 - 100 for \$17.00
YELLOW CAT# LED-3 10 for \$1.50 - 100 for \$17.00
FLASHING LED
CATE LED-4 2 for \$1.70
with built in flashing circuit operates on 5 volts
RED CAT# LED-4 10 for \$9.50
GREEN CAT# LED-4 10 for \$9.50
BI-POLAR LED
Lights RED one direction, GREEN the other. Two leads
CATE LED-5 10 for \$1.70
LED HOLDER
Two piece holder
CATE HLD-1 10 for \$1.00

DOOR/WINDOW ALARM
Protects doors and windows from intruders.
Opening of door or window pulls pin from alarm module and triggers loud buzzer. Simple installation. Operates on 2 AA batteries (not included). Plastic case is 3.32" X 2.29" X 1.19". Ivory with brushed aluminum face.
CAT# DWA \$2.00 each
5 for \$9.00

PIEZO WARNING DEVICE
Murata Ene a P8B-440
High pitched audible alarm. Operates on 3-20 Vdc @ 20 ma. 1" high x .75" dia. P.C. board mount.
CAT# PZ-84 \$1.75 each

WIDE BAND AMPLIFIER
NECA UP5C1050 1500 mW @ 3 db
Gain: 10db @ 1400 Hz. 5 volt operation.
Small package approx. dia. 2.3 mm thick.
CAT# UP5-1050 2 for \$1.00
10 for \$6.50 - 100 for \$30.00

SWITCHES
ITT PUSH BUTTON
ITT MDP, series 3/4" X 1/2" grey rectangular
key cap, S.P.S.T., N.O.
Push to close. RATED: 0.1 amp switching, 0.25 amp carry current. P.C. mount. CAT# PB-8 100 each - 10 for \$8.00 - 100 for \$80.00

10 POSITION MINI-ROTARY
Grayhill SP606-01-10N-C
Mini rotary switch. Non-shorting
1 deck, 10 positions, 125° det. shaft X 27° long. 37° behind the panel depth. P.C. pins.
CAT# MRS-10 WAD \$2.50 NOW \$1.50 each

SOUND AND VIDEO MODULATOR
The LM1370-1 designed for use with T.V. computers. Can be used with video cameras, games or other audio/visual sources. Built in video switch enables user to switch from T.V. antenna without disconnection. Operates on channel 3 or 4. Requires 12 Vdc. Hook up diagram included.
CAT# AVMD0 \$3.00 each

NICKEL-CAD BATTERIES (RECHARGEABLE)
SPECIAL!!! AAA SIZE Panasonic P-AAA
1.2 volt @ 100 mAH
CAT# NCB-AAA \$1.50 each
10 for \$13.50 - 100 for \$125.00

STROBE KIT
Variable rate strobe kit. Flashes between 60 to 120 times per minute. Will operate on either 5 or 12 Vdc depending upon how you wire the circuit. Comes complete with P.C. board and instructions for easy assembly.
CAT# STROBE-1 \$1.50 each

PUSHBUTTON
Matsushita 1M2
Rated 5 amps @ 125/250 Vdc.
Black plastic pushbutton.
Switch body: .62" X .56" X .55".
CAT# PB-18 \$1.65 each - 10 for \$15.00 each

RELAYS
12 VOLT COIL SPDT.
Omron G5LE-12SP 4 amp contacts
355 ohm coil
Super cube size
.61" X .42" X .44" high
P.C. mount with pins on DIP spacing
CAT# RLY-12P \$1.50 each

LIGHT ACTIVATED MOTION SENSOR
The device contains a photo eye which senses sudden changes in ambient light. Could be used as a door annunciator or modified to trigger other devices.
5 1/2" X 4 1/4" X 1 1/2". Operates on 6 Vdc. Requires 4 AA batteries (not included).
CAT# LMSD \$5.75 per unit

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TO-92 5 for 75c
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MJ2955 PNP
TO-3 5 for 75c
MJE2955 PNP
TO-220 75c each
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TO-220 75c each
TIP121 NPN
TO-220 75c each
TIP126 PNP
TO-220 75c each

TELEPHONE COUPLING TRANSFORMER
Mini Products International A19H-10D1
Primary 600 ohm
Secondary 600-500 ohm
77 X 11 X 1.65 high
6 p.c. pins on 187° centers
Primary inductance
300 mH min. at 100 Hz, 1 volt
CAT# TCT-1 \$1.25 each - 10 for \$11.00

PUSHBUTTON SWITCH
GQ/Thomson 34-20
S.P.S.T., normally open momentary push button switch. Red plastic actuator. 37° det. Chrome bezel .68" diameter. Threaded bushing holes in .50" dia. chassis hole. Rated 3 amp @ 250 Vdc. Solder loop terminals.
CAT# PB-20 \$1.00 each

10 AMP SOLID STATE RELAY
ELECTROLUX S211
CONTROL
Rated 5.5 to 10 Vdc
Full operation on 3-30 Vdc
LOAD: 10 amp @ 240 Vdc
2 1/4" X 1 3/4" X 7/8"
CAT# SSR-10 \$9.50 each
QUANTITY DISCOUNT
10 for \$85.00 - 25 for \$175.00
50 for \$300.00 - 100 for \$500.00

1/4 WATT RESISTOR KIT
Ideal for the workshop, this 1/4 watt resistor kit contains 10 pieces each of 42 of the most popular values (420 pieces total). Includes a divided box and a parts locator.
VALUES in Ohm kit are:
1 ohm, 10 ohm, 20 ohm, 47 ohm, 100 ohm, 200 ohm, 300 ohm, 470 ohm, 560 ohm, 680 ohm, 1K, 1.2K, 1.5K, 2K, 2.2K, 2.7K, 3K, 4.7K, 5.1K, 5.6K, 10K, 15K, 20K, 30K, 33K, 39K, 47K, 56K, 68K, 100K, 150K, 200K, 220K, 470K
1 MEG, 5 MEG, 10 MEG, 100 MEG
The resistors alone would sell for \$21.00
Complete kit: CAT# REKIT-14 \$17.00

OPTO ISOLATOR
Siemens 30T1-1281
Signal applied to the input is coupled by means of light to isolated photo output.
Cuts off high reliability switching. 12 volt input.
CAT# OP-301 \$1.50 each

A.C. LINE CORDS
Black, 6 ft., 16/2, 30 ft.
NON-POLARIZED PLUG
CAT# LCC-1 2 for \$1.00 - 100 for \$45.00
POLARIZED PLUG
CAT# LCP-1 50c each - 100 for \$50.00

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200 ASSORTED
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Bent leads, carbon comp. and carbon film.
CAT# GRE-1 \$1.00 per assortment
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Bent leads, carbon comp. and carbon film.
CAT# GRABE-1 \$1.00 per assortment
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DISC CAPACITORS
Most are 50 p.f. (100 p.f.) Some to 500 volts
CAT# GRABO-1 \$1.00 per assortment
15 VALUES OF
ELECTROLYTICS
Contains both solid and electrolytic types from 1 mfd.
CAT# GRABCP \$1.00 per assortment

XENON TUBE
1" long flashlight prepped with 3 1/2" red and black leads. Ideal for electronic flash or strobe projects.
CAT# FLT-2 10 for \$1.00

VALUES in Ohm kit are:
1 ohm, 10 ohm, 20 ohm, 47 ohm, 100 ohm, 200 ohm, 300 ohm, 470 ohm, 560 ohm, 680 ohm, 1K, 1.2K, 1.5K, 2K, 2.2K, 2.7K, 3K, 4.7K, 5.1K, 5.6K, 10K, 15K, 20K, 30K, 33K, 39K, 47K, 56K, 68K, 100K, 150K, 200K, 220K, 470K
1 MEG, 5 MEG, 10 MEG, 100 MEG
The resistors alone would sell for \$21.00
Complete kit: CAT# REKIT-14 \$17.00

OPTO SENSOR
u-shaped package with mounting base. 1/8" opening. 3/4" mounting holes. CAT# OS-1 \$1.50 each
10 for \$14.50 - 100 for \$125.00

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CS-510A 14.7 Vdc
60 Hz, 8.82 VA
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SPY RADIOS WANTED! Buying all types of espionage radios and code machines! Especially wanted are military-type radios in civilian suitcases! Museum, Box 8146, Bossier City, LA 71113, 318-798-7319.

HAM RADIO REPAIR, all makes, all models. Robert Hall Electronics, PO Box 8363, San Francisco, CA 94128, 408-729-8200.

BEAM Headings your QTH. \$9.95. W8JBU, 253 River Road, Hinkley, OH 44233.

TEFLON, SASE. W9TFY, Alpha, IL 61413.

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ATARI CW, RTTY, ASCII, and Packet Programs for 8 bit models. Each program available on disk for \$15 and on cartridge for \$35. SASE for info. Electrosoft, 1656 South California Street, Loveland, CO 80537.

RIGID Plexiglas Cover for following keys: Bencher \$9.95; MFJ-422 \$9.95; Vibroplex Iambic \$11.95; George Chambers, K0BEJ, 302 S. Glendale Avenue, Coffeyville, KS 67337.

DX QSLs. The "Go List". We make getting the QSL cards as much fun as the QSO itself. Over 5000 QSL managers. Updated and published monthly. The W6QO/K6HHD QSL Manager List, POB 700A, Rio Linda, CA 95673. \$20/yr/USA.

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'N-TENNA Quad Kits, Boomless Tribanders, \$64.50. Box 5332, Hickory, NC 28603.

KWM-380/HF-380 Repairs. Kirby, K7WOC, 713-320-2324.

TUBES WANTED! I pay cash or trade for all types of transmitting or special purpose tubes. Mike Forman, 1472 McArthur Blvd, Oakland, CA 94602, 415-530-8840.

QRP CW Xmr Kits and Components. SASE brings catalog. W1FB, Box 250, Luther, MI 49656.

HAM PROGRAMS for Commodore, IBM-PC, Apple, T199/4A. Send legal size SASE: EPO Software, 7805 NE 147th Avenue, Vancouver, WA 98682.

ELECTRON TUBES. All sizes and types. Transmitting, Receiving, Microwave—large inventory. Same day shipment. Ask about our 3-500Z special. Daily Electronics, PO Box 5029, Compton, CA 90224, 800-346-6667.

APARTMENT Dwellers/Portable Antenna System. For HF. SASE for information. Burk Electronics, 35 North Kensington, La Grange, IL 60525, 312-482-9310.

CIPHERING Equipment (M-209, M-94, others) Wanted. Books, Manuals, anything related to secret writing. WB2EZX, 17 Alfred Road, Merrick, NY 11566, 516-378-0263.

LIMITED Space Dipoles... Tri-Bander 160/80/40... \$75; Dualband 160/80, 160/40, 80/40... \$59.50; 80/20... \$49.50; 40/10... \$47.50. All coax fed, low VSWR, no tuning required, maximum power. G5RV... \$35; G5RV junior... \$32. UPS prepaid. SASE. Tom Evans, W1JC, 113 Stratton Brook, Simsbury, CT 06070.

VACATION—Ham high in Colorado Rockies. Furnished Mt. Chalet with 205B @ 85° and Collins station. By week. W0LSD, 719-395-6547 nights.

WANTED by oldtimer Philmore NT-200 Novice Rig, Barker & Williamson 5100-B, Clegg 62T10 Climaster, National NC-88, Hallcrafters HT-31 or HT-33. Even if not working, unit should be cosmetically mint or near mint or else I get thrown out of the house along with "all that dirty junk". Will pay fair price. Contact WA1YIW, 3245 Heather Hill Lane, Tallahassee, FL 32308, 904-893-9936 after 9 PM.

HAM HOLIDAY in VP5. Join cycle 22 fun from rare DX QTH, Turks & Caicos Islands. We supply transceiver, antenna, process license and offer accommodations as low as 7 nights \$380 each; double occupancy in private bungalow. Direct Pan Am service, 80 minutes Miami. Details VP5D, PO Box 100858, Ft. Lauderdale, FL 33310.

SUPER VR85 replaces the popular VR85 satellite tracking program for the Commodore 64. Features include high resolution color map and satellite sprite, tracking data display, footprint sprite, ground trace, mutual acquisition table, transponder mode display, room for twenty satellite Keplerian element sets, Autotrack compatibility, extensive instructions, and strong user support. Send SASE for details. Super VR85: \$35 pdd. (CA residents add 6% sales tax.) RLD Research, McCloud, CA 96057. W6AMW owner.

COLLINS Repair and Alignment, former Collins engineer. Research and Consulting, Glenn A. Baxter, PE, Registered Professional Engineer. K1MAN, 207-495-2215.

International Amateur Radio Network broadcasting schedule. SSB: Daily 3.975/14.275/28.475 at 1200Z, 1400Z, 1800Z, 2200Z, 0100Z; Monday 7.275, 1500Z. AMTOR: Monday 14.075, 1600Z. AM: Sunday 3.890, 2300Z; 7.290, 2400Z. Address: IARN, Belgrade Lakes, ME 04918, tel 207-495-2215, FAX 207-495-2069, computer BBS 207-495-2490.

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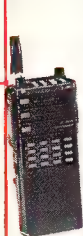
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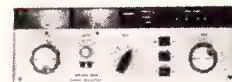
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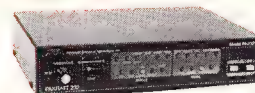
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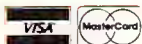
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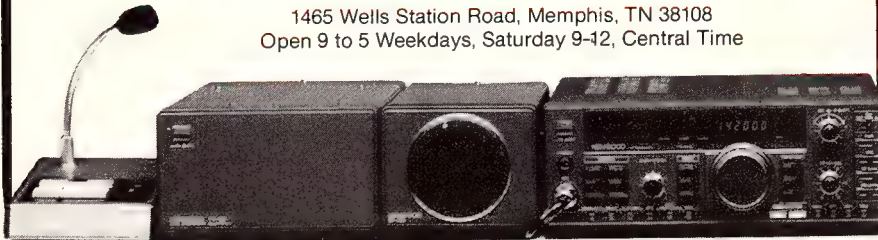
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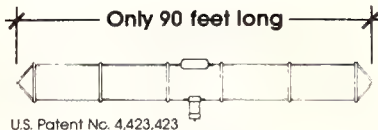
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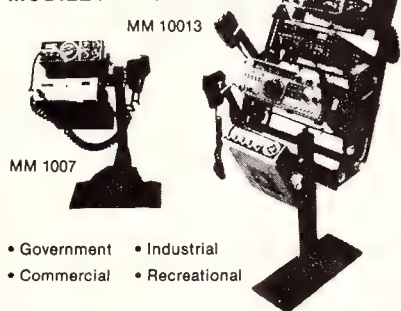
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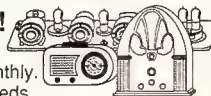
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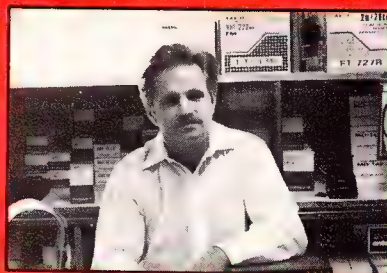
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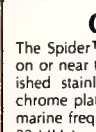
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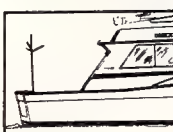
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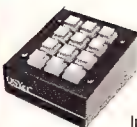
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WANTED: Collins 51S1 Receiver. Carter Elliott, WD4AYS, 1460 Pinedale Road, Charlottesville, VA 22901, 879-7383.

HAM PROGRAMS over 400 & others for C64. SASE for catalog. Manna Software, 15426 Yukon Avenue, Lawndale, CA 90260.

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ICOM, Kenwood & Yaesu Owners: Informative separate newsletters. 10th year. USA bulk (\$10.50), FC (\$12.50), Canada (\$13), Elsewhere (\$14 & \$18). Free catalog. Send 45 cent SASE. International Radio & Computers Inc, 751 South Macedo Blvd, Port St Lucie, FL 34983, 1-407-879-6868.

COMMUNICATIONS Receivers: The Vacuum Tube Era. Book covers history, specs on 700 receivers, 51 companies, 123 photos. \$14.95 plus \$2 p/s. Details SASE. RSM Communications, Box 218-Q, Norwood, MA 02062.

WANTED: Yaesu FT-680R 6M Xceiver, any condition, QSL w/price or call collect. (Best time 7-11 PM EST.) Bob, K14MB, 6808 N. 18th Street, Arlington, VA 22205, 703-533-0650.

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WANTED: Eprom Programmer for 2716 +; Heathkit/others OK. K3LLH, 609-455-6838.

DIGICOM > 64 Technical Operations Manual. Painless Operations. Now on 5 1/4" C64 disk. \$5 ppd. Fuller, N3EFN, RD 2, Box 40-31, Guy Mills, PA 16327.

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IC-575A 10m/6m Xcvr	1399.00	Call \$
IC-726 HF/50 MHz All Mode	1299.00	Call \$
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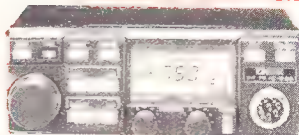
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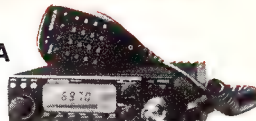


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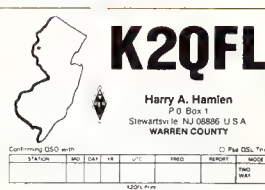
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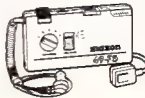
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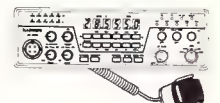
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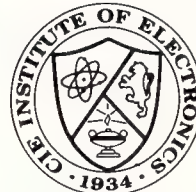
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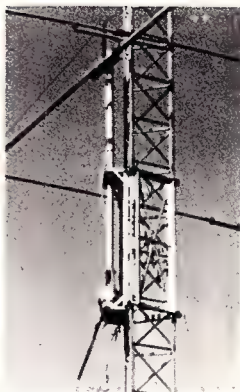
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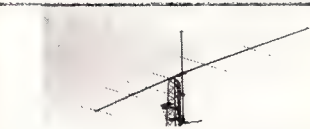
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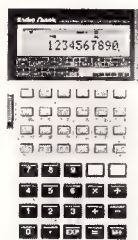
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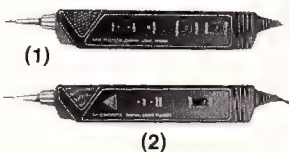
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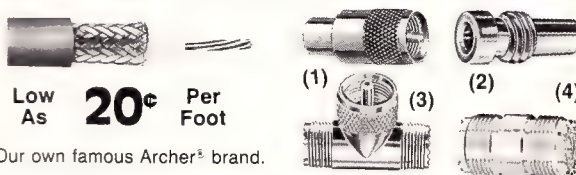
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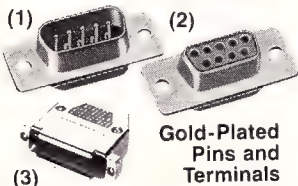
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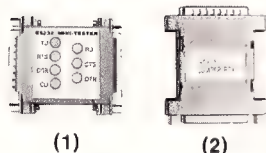
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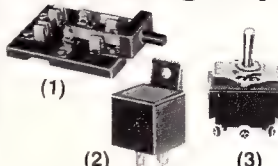


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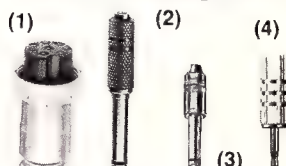


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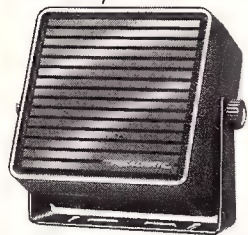
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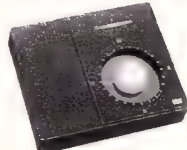
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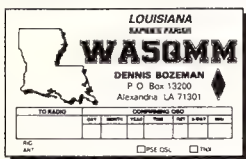
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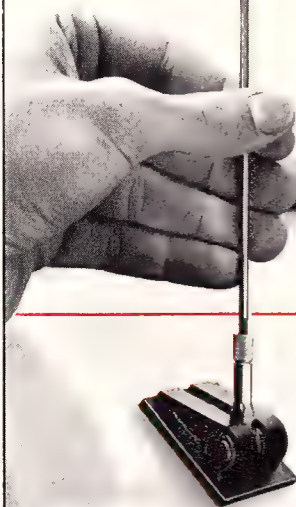
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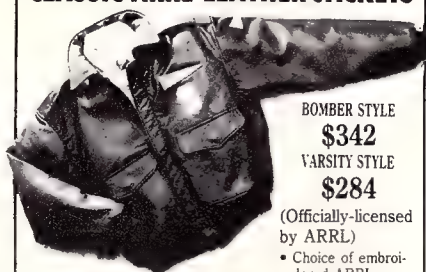
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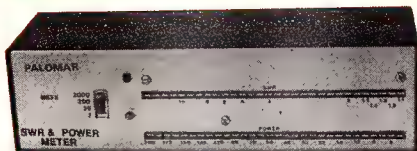
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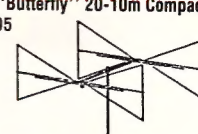
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FT-212 RH

THE "ANSWERING MACHINE" 2 METER MOBILE

- 45 Watts Output • Multiple Scanning Routines
- 10 Memories • Hi/Low Power Switch

ICOM NEW!

IC-2 SAT

MINI 2 METERS FM HANDHELD

- Receive 138-174 MHz
- Transmit 140-150 MHz
- Up to 5 Watts Output
- 48 Memories
- Band and Memory Scanning
- Automatic Power Shut-Off

ASTRON



- RS7A . . . \$51 • RS35M . . \$167
- RS12A . . . \$75 • VS35M . . \$179
- RS20A . . . \$92 • RS50A . . \$209
- RS20M . . \$112 • RS 50M . \$235
- VS20M . . \$129 • RM50M . \$259
- RS35A . . \$149 • VS50M . . \$245

KENWOOD

TH-75A

2M/70CM DUAL BAND HT

- Receive 141-163.995 & 438-449.995 MHz
- One Watt Power on Each Band
- Monitor Both Bands at Same Time
- CTCSS Encode/Decode Built-in

YAESU NEW!

FT-470

COMPACT DUAL BAND FM HANDHELD (2M/70CM)

- 21 Memories for Each Band
- Dual VFO's for Each Band
- Up to 5 Watts Power
- Built-in CTCSS
- Built-in 10-Memory DTMF Autodialer

ICOM

IC-32AT SUPER DUALBAND FM HANDHELD

- 5 Watts on Both Bands
- Receive 138-174 MHz 440-450 MHz
- Stores Standard and Odd Offsets

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Extra Savings on the **MFJ-949D** Deluxe 300 Watt Tuner

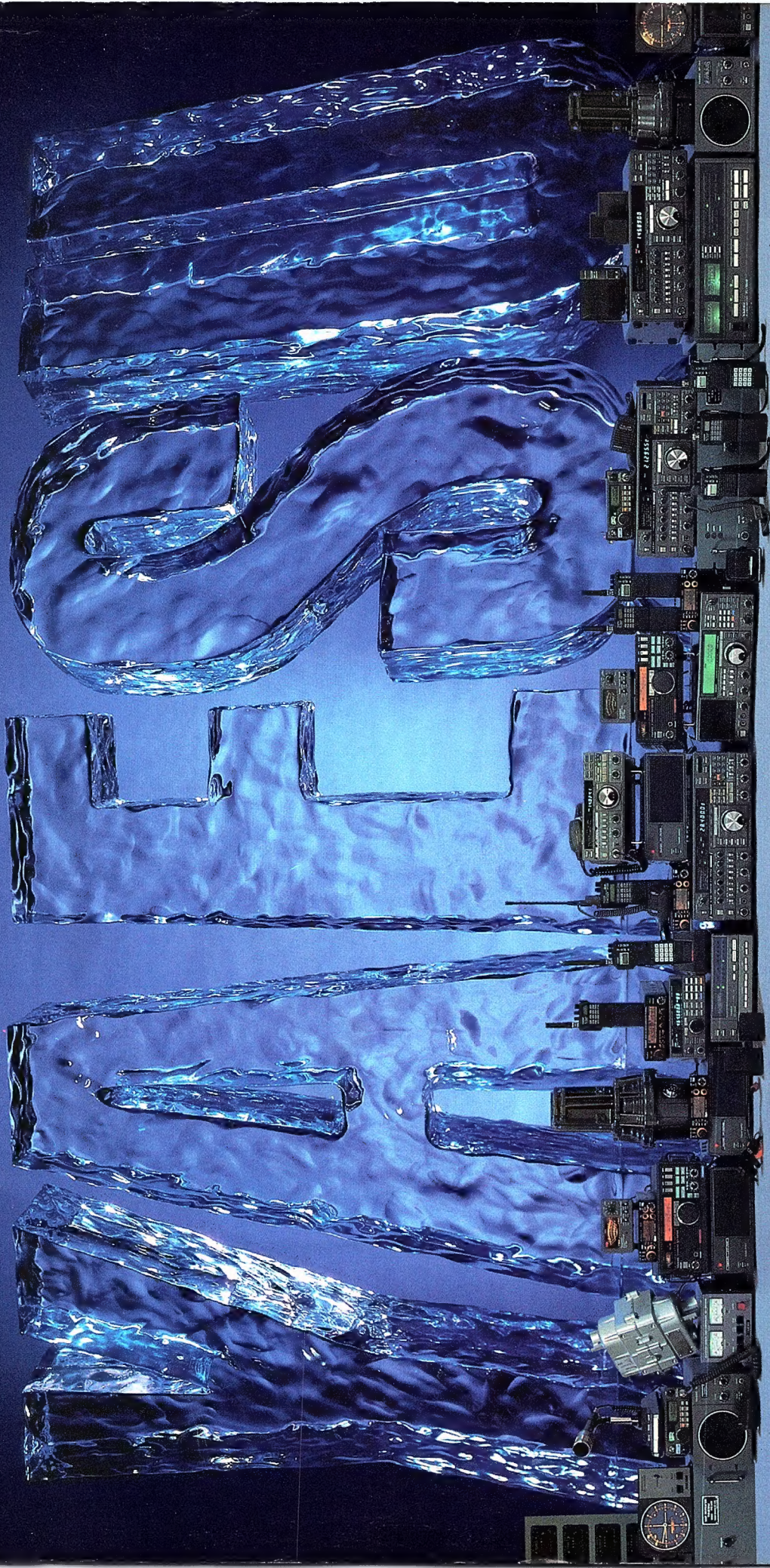
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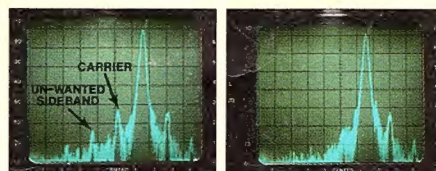


* For More Information, call 1-800-999-2070

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DSP
Digital Signal Processing

Digital Signal Processing



Without DSP

With DSP

TS-950SD

"DX-clusive" HF Transceiver



The new TS-950SD is the first Amateur Radio transceiver to utilize Digital Signal Processing (DSP), a high voltage final amplifier, dual fluorescent tube digital display and digital meter with a peak-hold function.

• **Digital Signal Processor.** DSP is a state-of-the-art technique that maximizes your transmitted RF energy. Your signal stands out because it is much more pure than your competition! You can even tailor your transmitted CW or voice signal waveshape!

• **Dual Frequency Receive Function.**

The TS-950SD can receive two frequencies simultaneously. The sub-receiver has independent controls for frequency step size, noise blanker, and AF gain and its own digital display!

• **New! Digital AF filter.** Synchronized with SSB IF slope tuning, the digital AF filter provides sharp characteristics for optimum filter response.

• **New high voltage final amplifier.** 50V power transistors are used in the 150W final section, resulting in minimum distortion and higher efficiency. Full-power key-down time exceeds one hour.

• **New! Built-in microprocessor controlled automatic antenna tuner.**

The new antenna tuner is faster and you can store the settings in memory! (Manual override is also possible.)

Optional Accessories

- VS-2 Voice synthesizer
- SP-950 External speaker w/AF filter
- SM-230 Sta-

tion monitor w/pan display

- SW-2100 SWR/power meter
- TL-922A Linear amplifier (not for QSK)

Transmit the ultimate signal.

• **Outstanding general coverage receiver performance and sensitivity.** Kenwood's Dyna-Mix™ high sensitivity direct mixing system provides incredible performance from 100 kHz to 30 MHz. The Intermodulation dynamic range is 105 dB.

• **Multi-Drive Band Pass Filter (BPF) circuitry.** Fifteen band pass filters are available in the front end to enhance performance.

• **High performance IF filters built-in.** Select various filter combinations from the front panel. For CW: 250 and 500 Hz, 2.4 kHz for SSB, and 6 kHz for AM. Filter selections can be stored in memory!

- **Kenwood interference reduction circuits.** SSB Slope Tuning, CW VBT (Variable Bandwidth Tuning), CW AF tune, IF notch filter, dual-mode noise blanker with level control, 4-step RF attenuator (10, 20, or 30 dB), switchable AGC circuit, and all-mode squelch.
- **Built-in TCXO for highest stability.**
- **Built-in electronic keyer circuit.**
- **100 memory channels.** Store independent transmit and receive frequencies, mode, filter data, auto-tuner data and CTCSS frequency.
- **Digital bar meter.**

Additional Features: • Built-in interface for computer control • Programmable tone encoder • Optional VS-2 voice synthesizer • Built-in heavy duty AC power supply and speaker • Adjustable VFO tuning torque • Multiple scanning functions • MC-43S hand microphone supplied

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Specifications, features and prices subject to change without notice or obligation.
Complete service manuals are available for all Kenwood transceivers and most accessories.